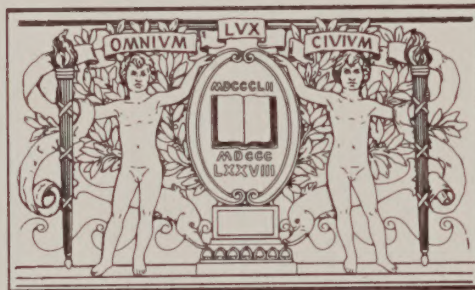


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Sh cut
In Grover



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<https://archive.org/details/buildingcollapse02bost>

THE BUILDING COLLAPSE AT
2000 COMMONWEALTH AVENUE
BOSTON, MASSACHUSETTS

on

January 25, 1971

REPORT

OF

Boston THE MAYOR'S INVESTIGATING COMMISSION
"

APPENDIX II. 1

CATALOG OF PIECES SAVED FROM THE COLLAPSE

JUNE 1971

Gov. Doc.
TH 441
. B6
vol. 2
cop. 2

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APPENDIX II. 1

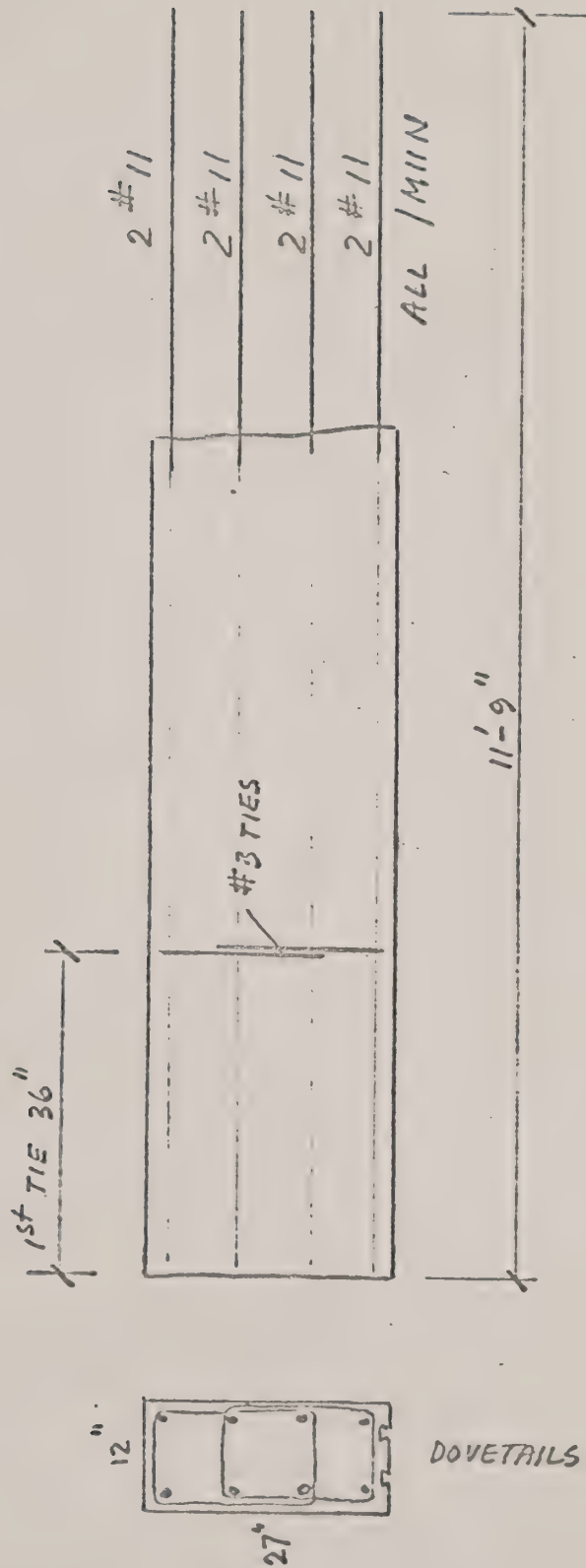
CATALOG OF PIECES SAVED FROM THE COLLAPSE

The search for the bodies of the four men who were killed continued from January 26, 1971, to February 15, 1971. During this period the John J. Duane Wrecking Company, Quincy, Massachusetts, removed most of the debris from the collapse.

As was convenient, without interfering with or delaying the search, the Duane Company personnel moved aside certain intact pieces of the structure. These pieces were marked with an identification number for later examination and testing.

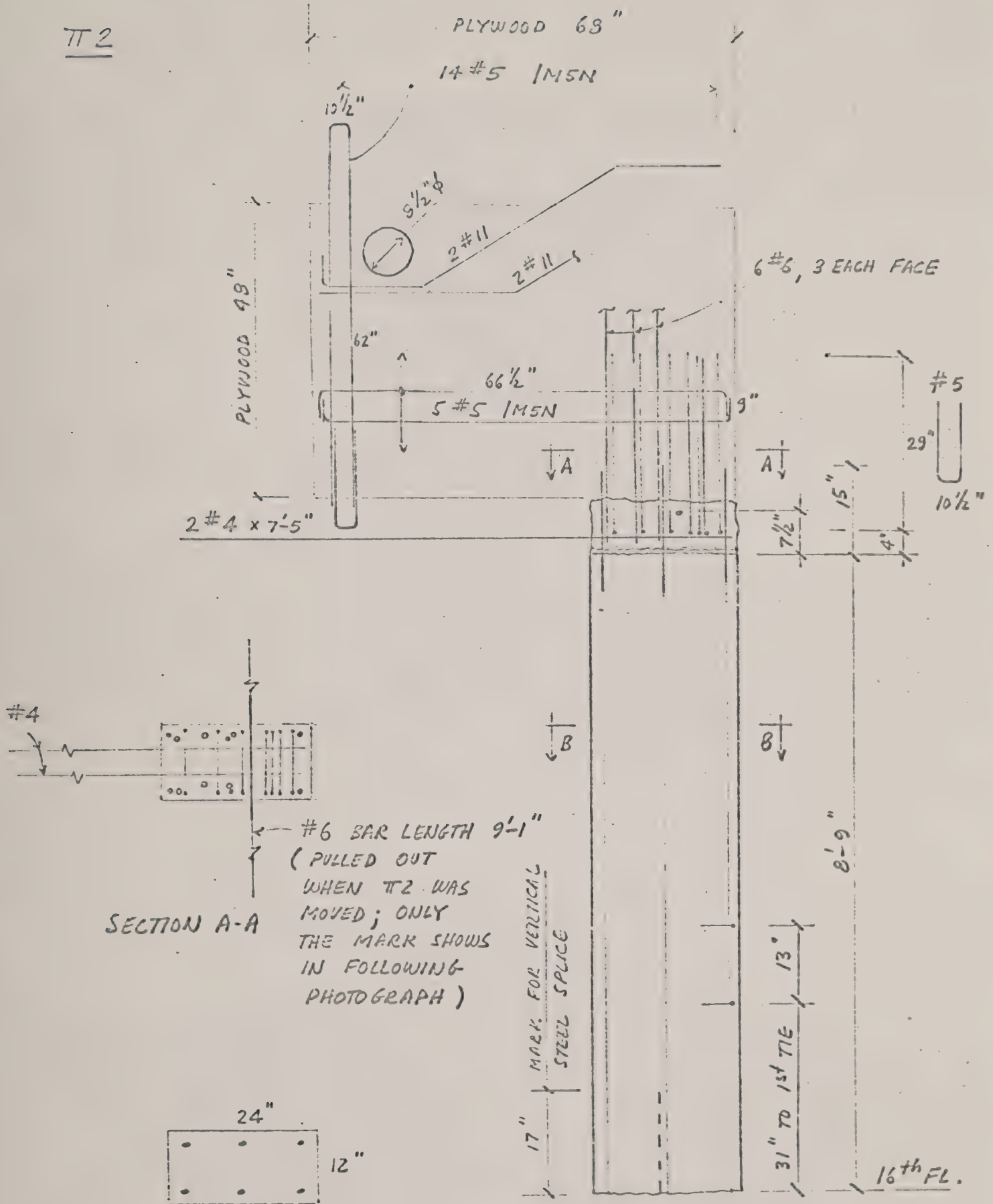
In the following catalog, sketches of 87 pieces are presented. These pieces are numbered Π 1 through Π 11, Π 13 through Π 28, Π 30 through Π 37, Π 39, Π 46 through Π 49, Π 53 through Π 63, Π 65 through Π 85, Π 87 through Π 91, and WF1 through WF10.

There are 14 omitted sketches for Π numbers between Π 1 and Π 91. Some of these pieces were marked while still in the basement area and were later hauled from the site as it was not convenient to save them. On a few other Π pieces, the identification marking became indiscernable after a thaw and a subsequent rain. The ten pieces marked with a WF prefix included some of those for which a Π number had been removed and a few extra pieces which were not marked in the first sequence.



IDENTIFIED AS COLUMN C6, H6, OR H7
FROM 7th TO 8th FLOOR

Π 2

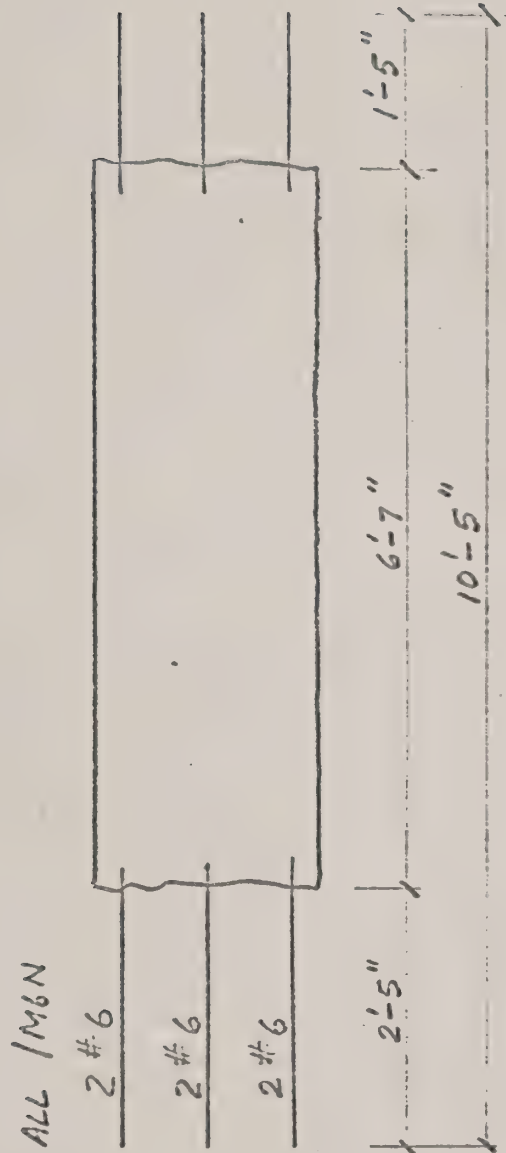


SECTION B-B

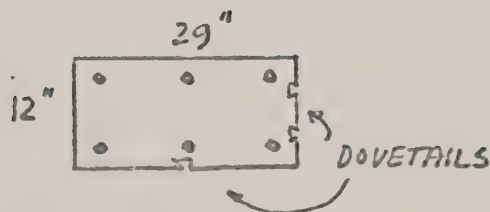
IDENTIFIED AS COLUMN E5 OR F5 FROM THE 16th FL. TO ROOF WITH FORMWORK, REINFORCING STEEL AND GREEN CONCRETE FROM ATTACHED BRACKET.

112 PHOTOGRAPHS





COLUMNS E2 AND F2
BETWEEN 8th FLOOR
AND ROOF HAD
DIMENSIONS 12"x29"
WITH DOVETAILS, BUT
PLANS CALLED FOR
8 #6, NO SPECIFIED
COLUMN HAD THE
GEOMETRY AND STEEL
FOUND IN π 3



Scale $\approx \frac{1}{2}'' = 1'-0''$

BOTTOM SURFACE UP

STEEL LAYER

1	↓	B
2	→	B
3	→	T
4	↓	T

TOP SURFACE HAS EXACT
CHARACTERISTIC OF ROOF
BUT GEOMETRY AND
STEEL COULD NOT BE
CORRELATED WITH
STRUCTURAL PLANS :
LOCATION UNKNOWN

9 1/2" MARKS OF #6

8 1/2"

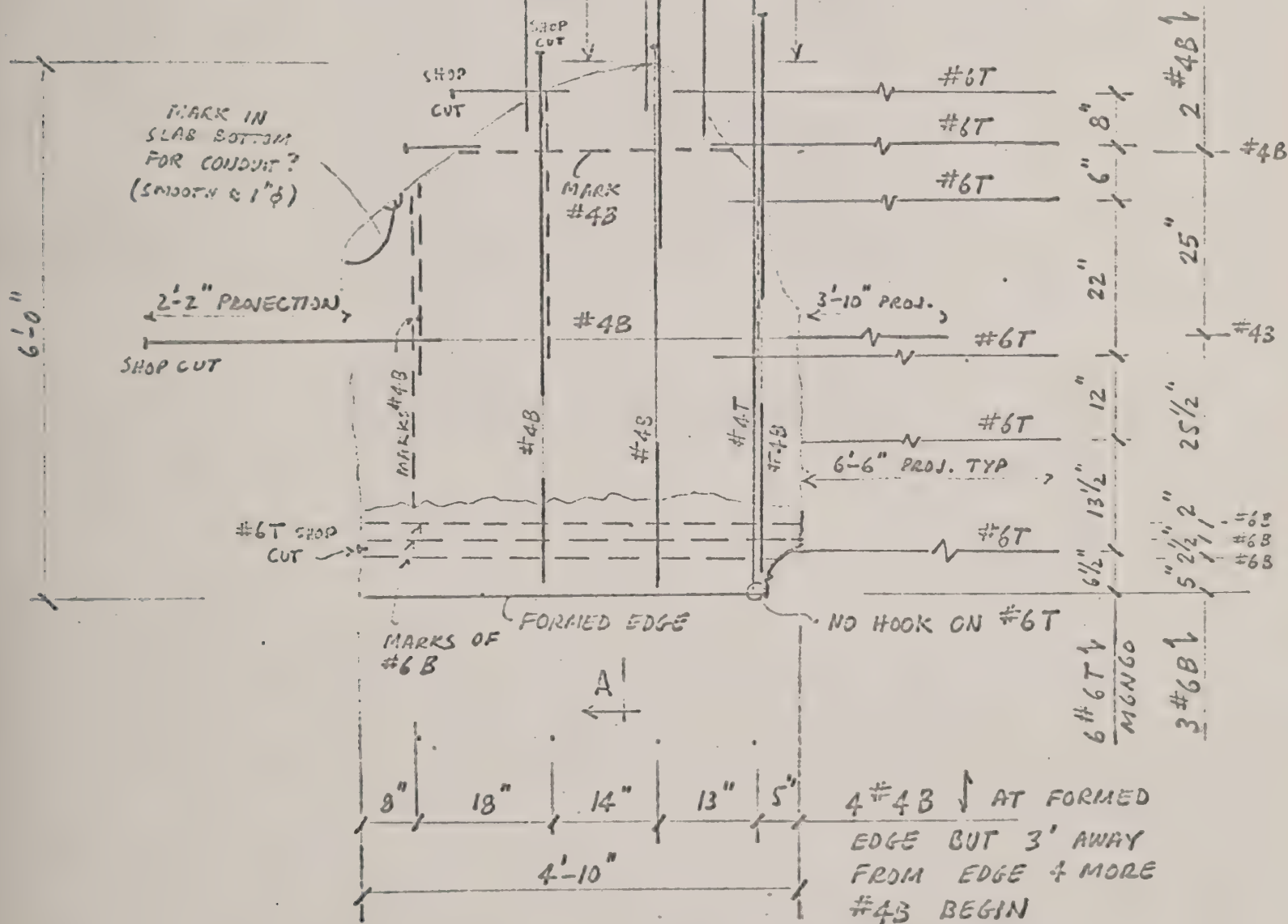
SURFACE BROKEN AWAY

g"

TOP SURFACE

NO CORNER NOTCH
OR DOWELS

SECTION A

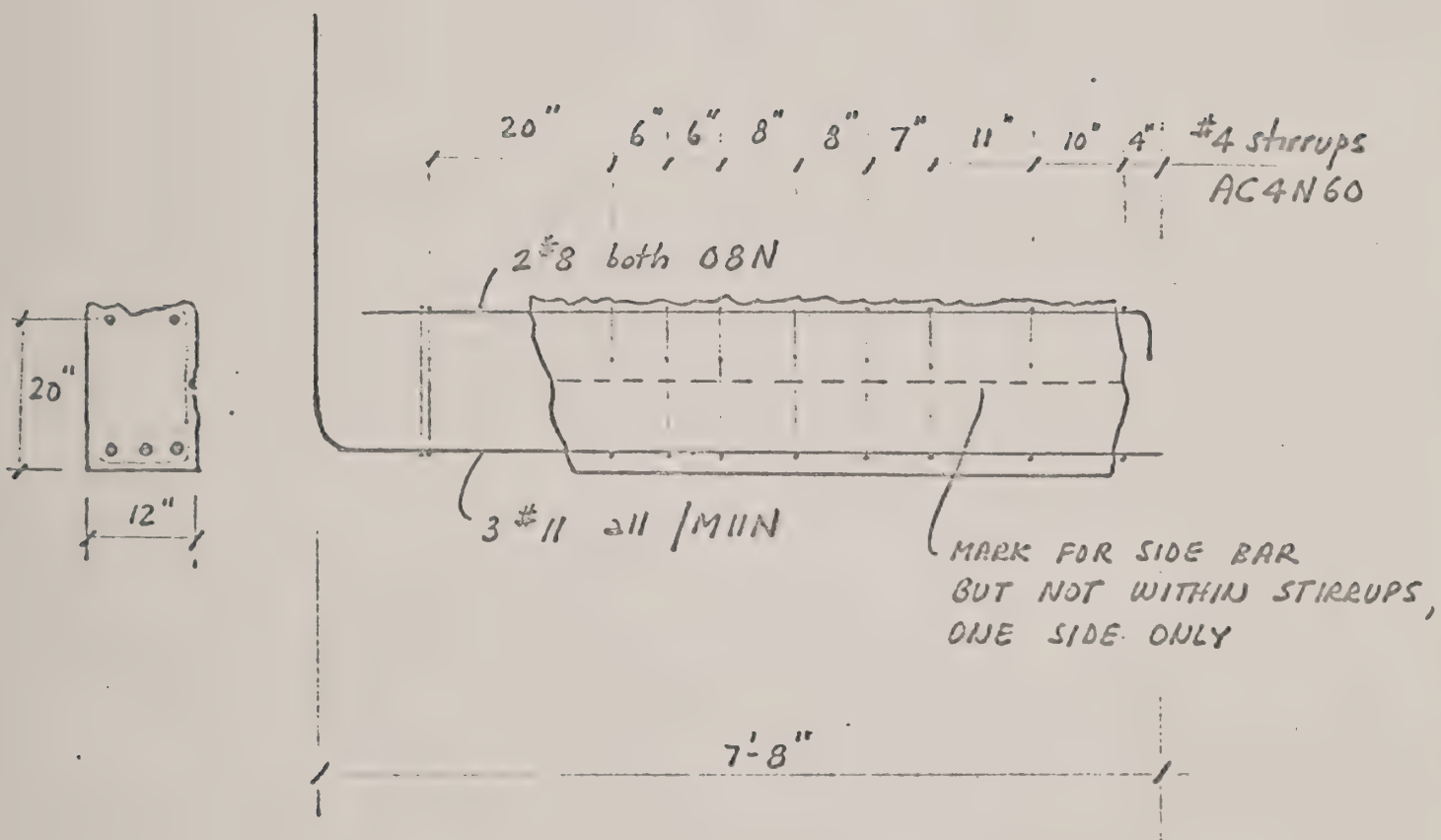


5-4" ϕ CORES

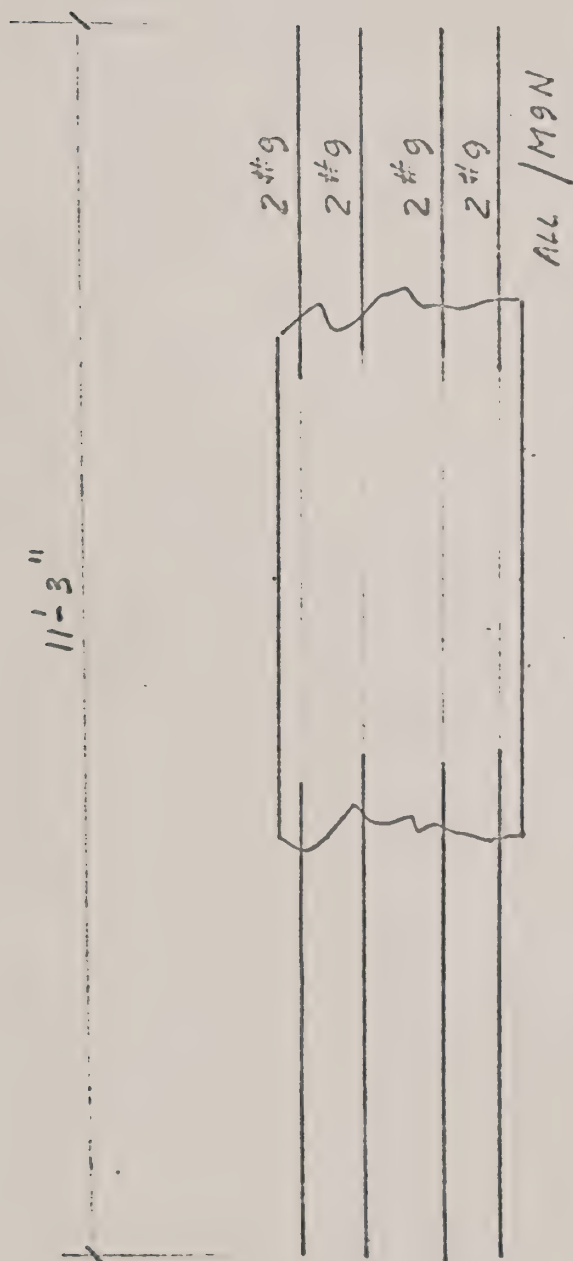
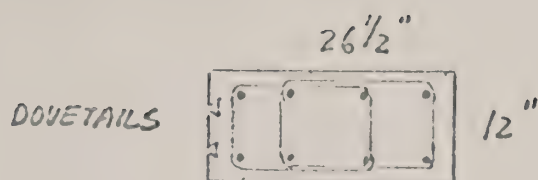
Π4 PHOTOGRAPH



π5



T6



THIS PIECE COULD BE
COLUMN C6, H6, OR H7
FROM 8th TO 9th FLOORS
OR COLUMN D2 OR G2
FROM 3rd TO 4th FLOORS

17

10'-0 1/2"

32 1/2"

NO TIES WITHIN
THIS HEIGHT

9'-0 1/2"

ALL / MIN

2 #11

2 #11

2 #11

2 #11

2 #11

2 #11

2 #11

2 #11

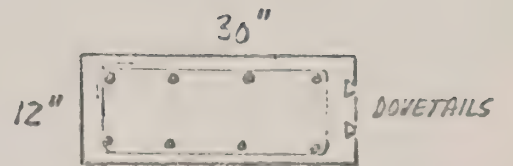
ALL / MIN

32"

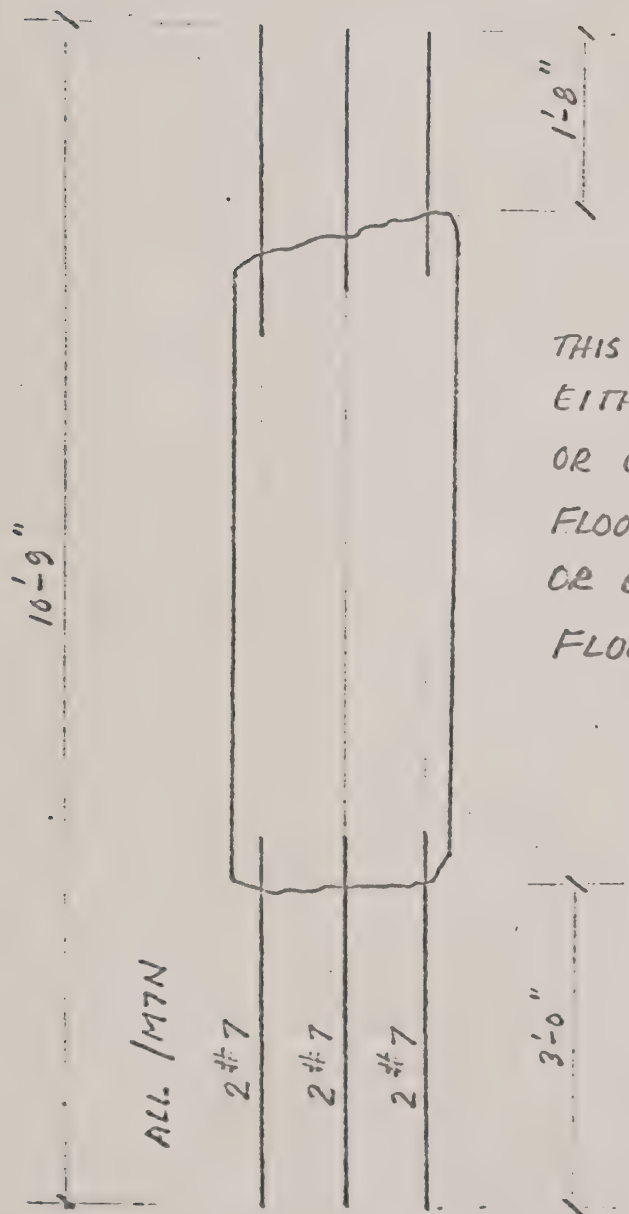
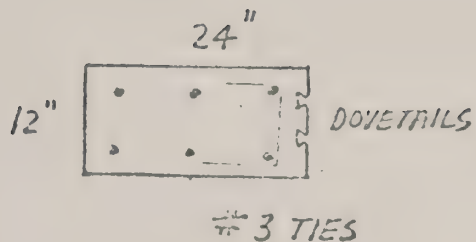
MARK FOR SPLICE
OF VERTICAL
STEEL FROM
COLUMN BELOW

36"

TO 1st TIE



IDENTIFIED AS COLUMN
C6, H6, OR H7. THE
SLAB BETWEEN WOULD
BE EITHER THE 5th
OR 6th FLOOR



THIS PIECE COULD BE
EITHER COLUMN D3, D4, G3,
OR G4 FROM 4th TO 7th
FLOORS OR COLUMN D2
OR G2 FROM 8th TO 9th
FLOOR

TOP SURFACE UP

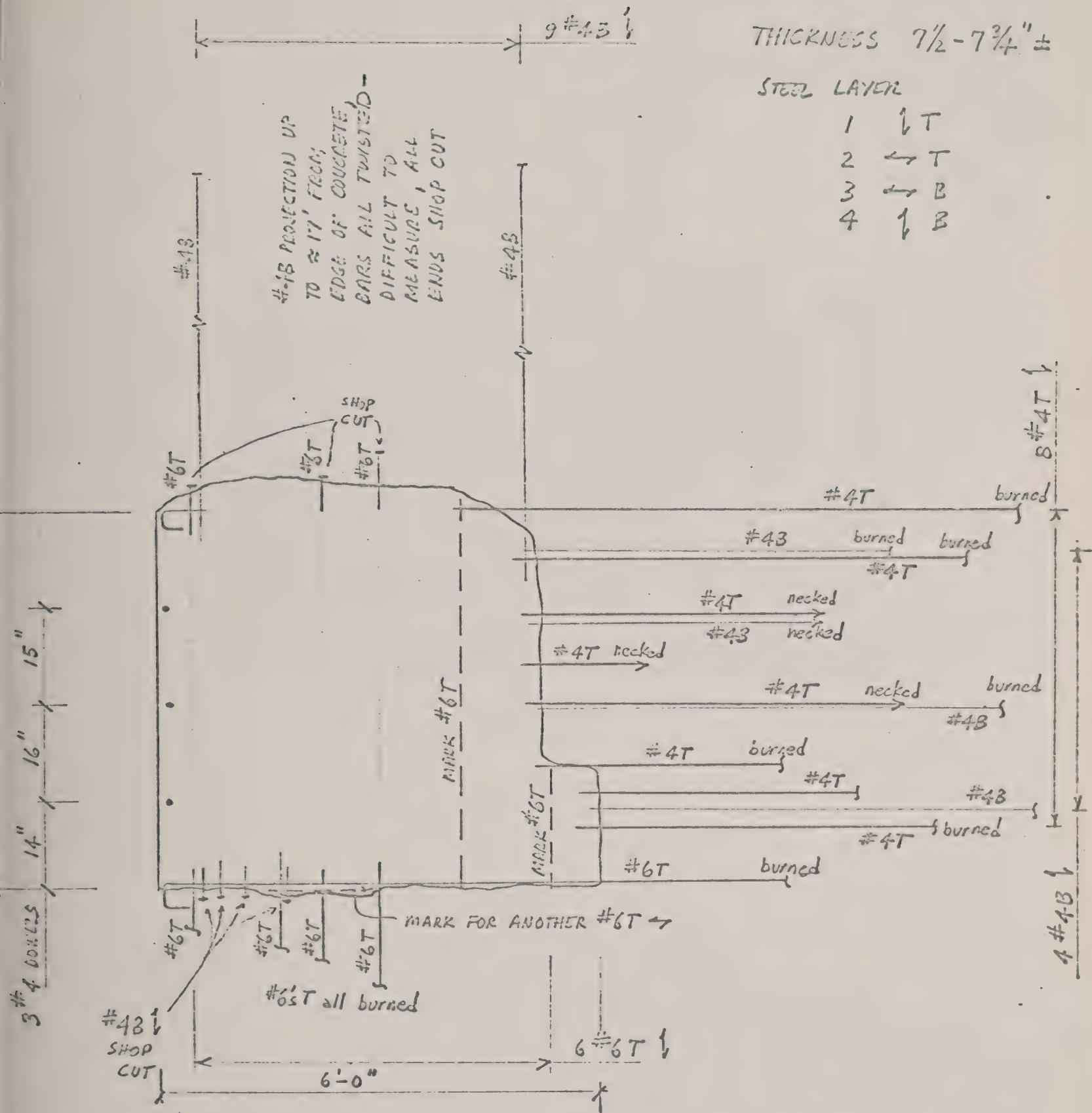
TOP SURFACE HAS
CHARACTERISTIC OF ROOF

THICKNESS $7\frac{1}{2} - 7\frac{3}{4}" \pm$

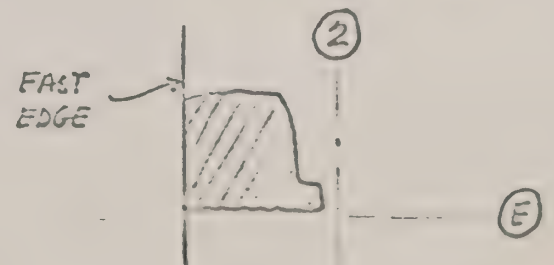
STEEL LAYER

1	↓ T
2	← T
3	→ B
4	↓ B

#18 PROJECTION UP
TO 2' FROM
EDGE OF CONCRETE
BARS ALL TWISTED -
DIFFICULT TO
MEASURE, ALL
ENDS SHOP CUT

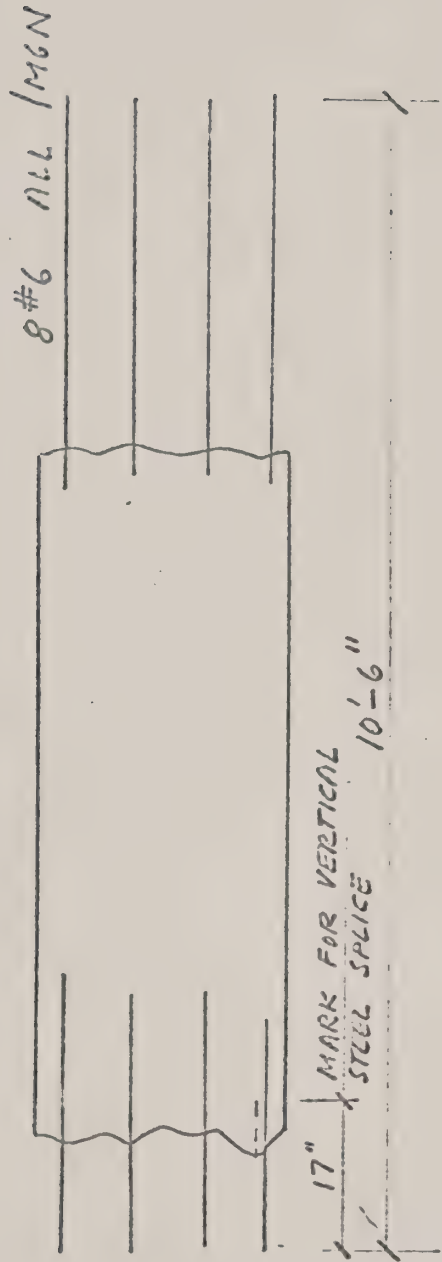
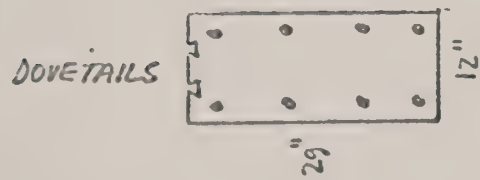


IDENTIFIED AS MAIN ROOF



Π9 PHOTOGRAPH





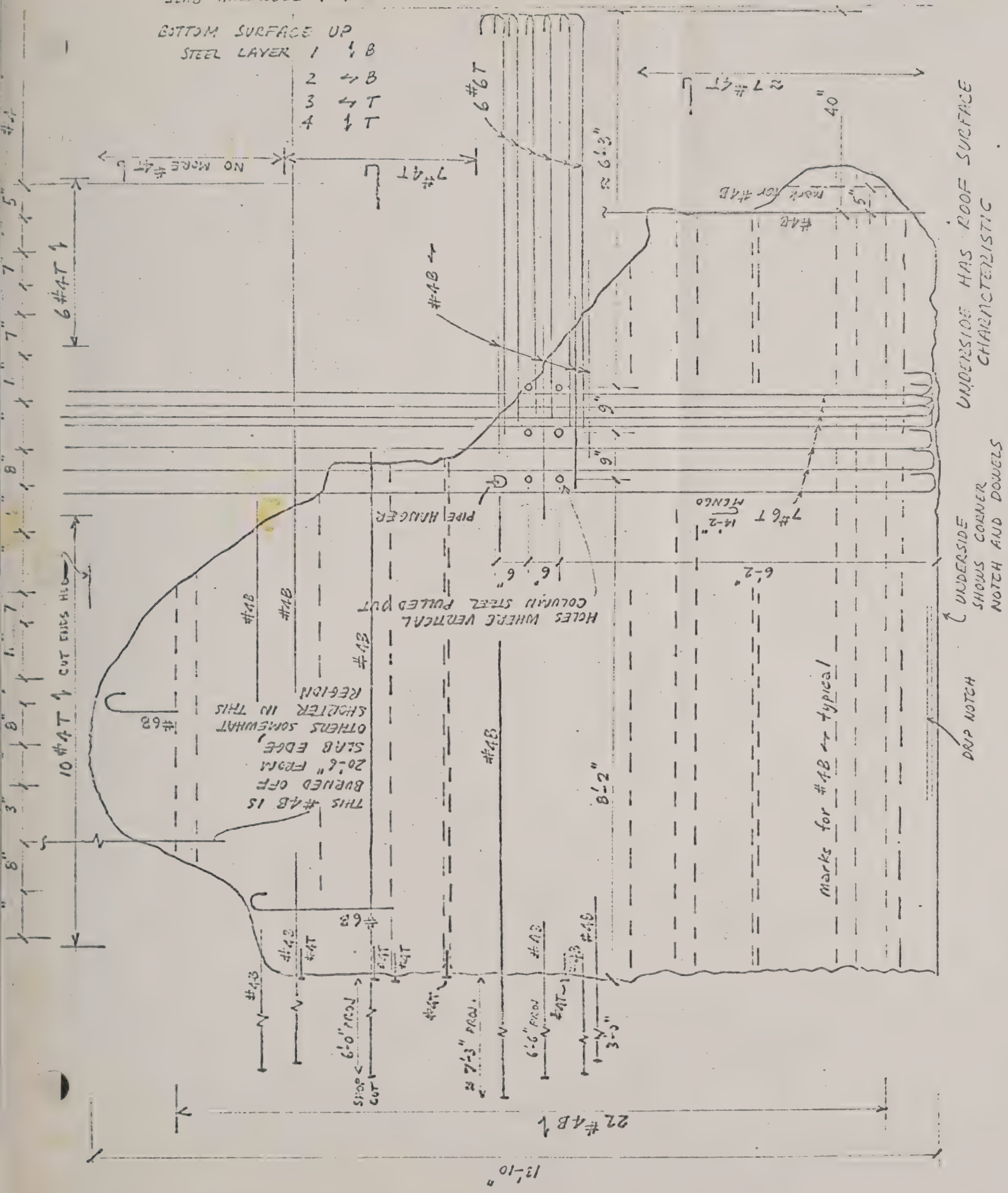
IDENTIFIED AS EITHER COLUMN E2 OR F2
SOMEWHERE BETWEEN THE 8th FLOOR
AND THE MAIN ROOF

IDENTIFIED AS SOUTHEAST CORNER
OF MAIN ROOF

SLAB THICKNESS $7\frac{3}{4}'' \pm$

BOTTOM SURFACE UP
STEEL LAYER 1 1 B

- 2 1 B
- 3 1 T
- 4 1 T



UNDERSIDE HAS ROOF SURFACE
CHARACTERISTIC

UNDERSIDE
SHOWS CORNER
NOTCH AND DOWELS

Drip notch

Marks for #4B typical

HOLES WHERE VERTICAL
COLUMN STEEL PULLED OUT

PIPE HANGER

THIS #4B IS
BURIED OFF
20.6" FROM
SLAB EDGE,
OTHERS SOMEWHAT
SHORTER IN THIS
REGION

#6B

#4B

#4B

#4B

#4B

8'-2"

#4B

#4B

#4B

22 #4B

13'-10"

6'-0" FROM
CUT

7'-3" FROM
CUT

6'-6" FROM
CUT

3'-3"

6 #4T

10 #4T CUT ENDS HERE

7 #4T

40"

Mark for #4B

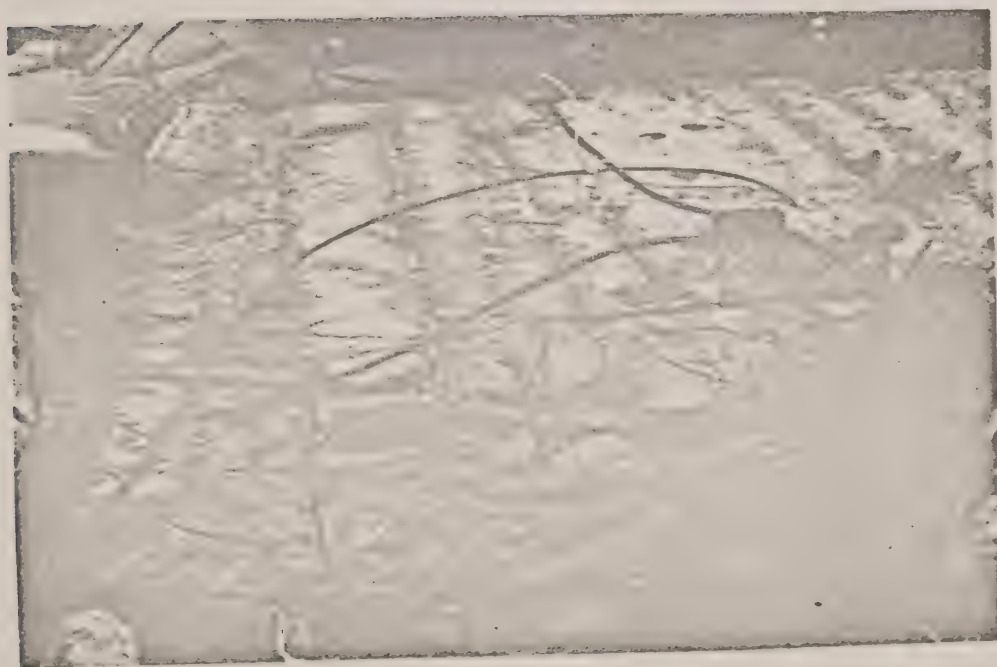
#4B

7 #6T
14'-2" MENGO

6'-2"

NO MORE #4T

II-11 PHOTOGRAPHS



PHOTOGRAPH

CLOSEUP OF COLUMN LOCATION

(A piece of #6 bar inserted in one of the holes where column bars had been. This #6 bar was not present in the recovered slab as may be seen in previous photographs.)



113

DOVETAILS

54 1/2"

12"

3 #9 09N60
2 #9 09N60
2 #9 1
3 #9 09N60

3rd Fl.

8" SLAB

2 #6 EXTEND 11'
H6N60

18"
6" 6"
#4
#4
#4

IDENTIFIED AS EITHER
COLUMN E2 OR F2
FROM 2nd TO 3rd FLOOR

9'-0"

3 #9 / M9N

2nd Fl.

SLAB

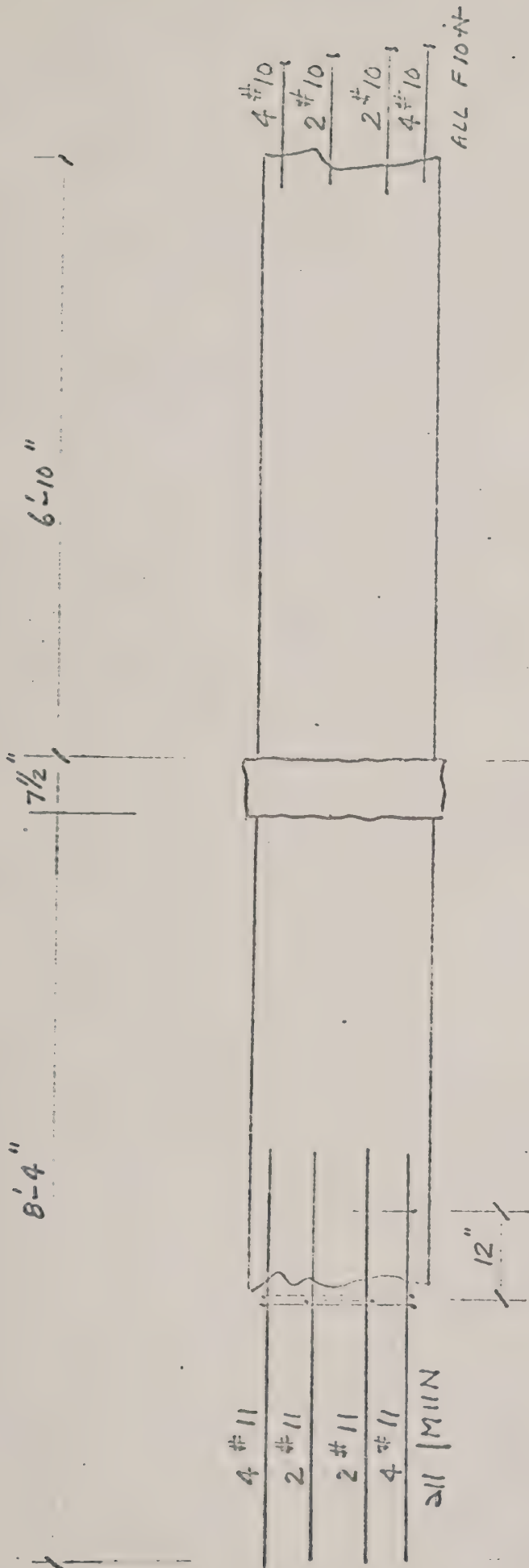
2 #6
H6N60

3 #9 2 #9
ALL 09N60

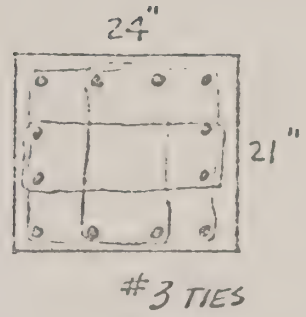
#6 1 (SPECIMEN TAKEN)
TRANSVERSE

30" ±

3 #11
2 #11
2 #11
2 #11
ALL / MIN



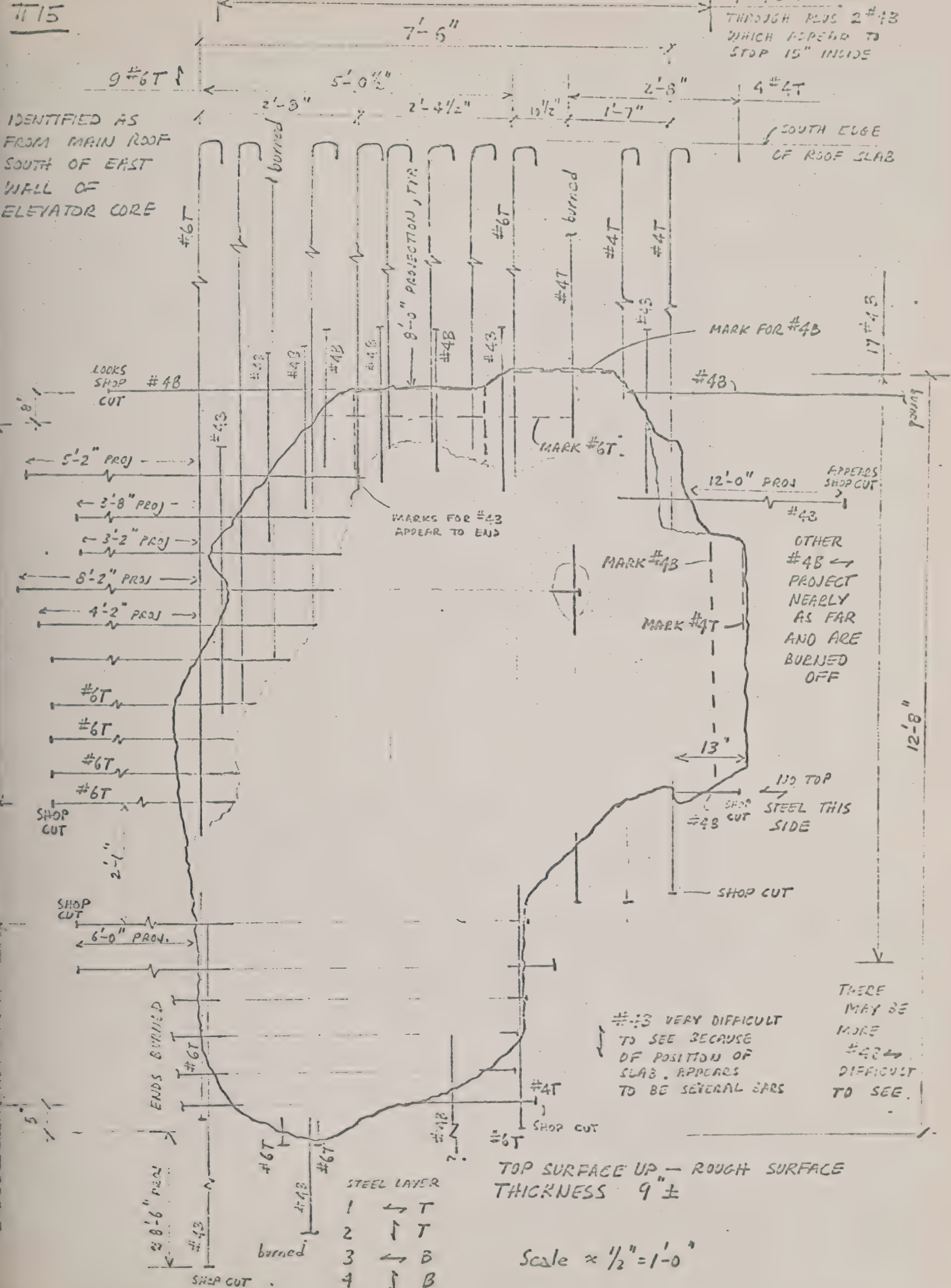
IDENTIFIED AS COLUMN
E3, E5, F3, OR F5 FROM
2nd TO 4th FLOORS



115

9" THICK 20
THROUGH REIN 2#43
WHICH APPEARS TO
STOP 15" INSIDE

IDENTIFIED AS
FROM MAIN ROOF
SOUTH OF EAST
WALL OF
ELEVATOR CORE



Π15 PHOTOGRAPHS



Π15 BEFORE BEING CUT LOOSE BY JOHN J. DUANE, CO.



Π15 FALLING TO THE GROUND

Π15

PHOTOGRAPHS



1116

34"

ALL / M815

IDENTIFIED AS EITHER
COLUMN G5 OR H5
FROM 2nd TO 3rd
FLOOR

2. DOVETAILS
ON EDGE AND
1 DOVETAIL
ON FACE

2nd FLOOR

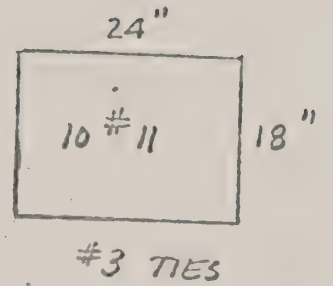
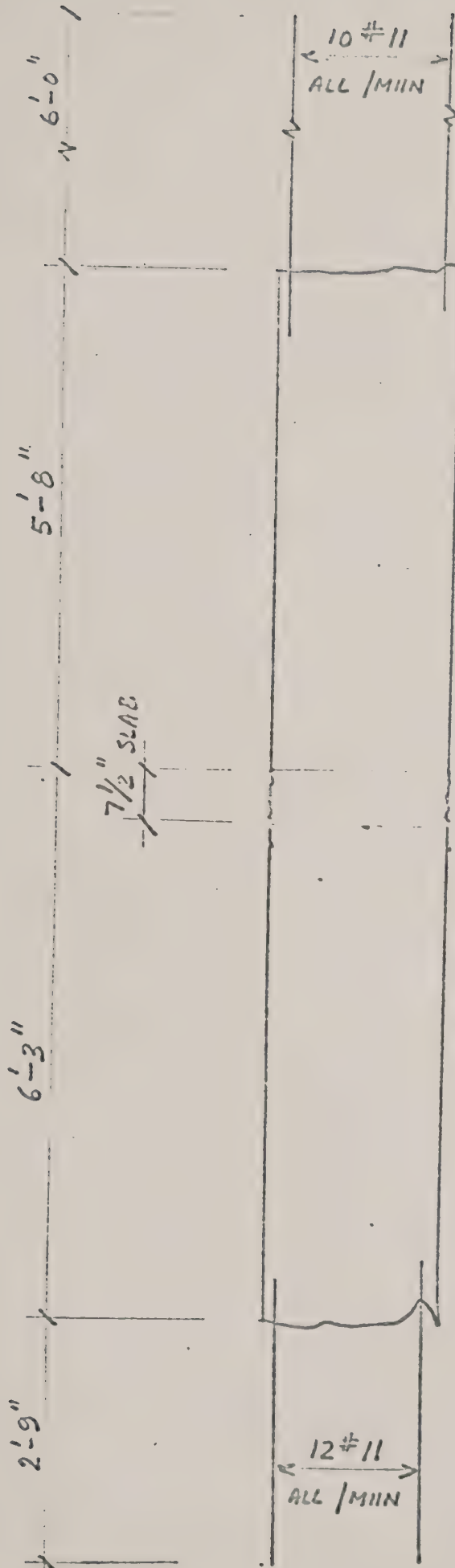
ALL N8 RAIL

8-3

3-0

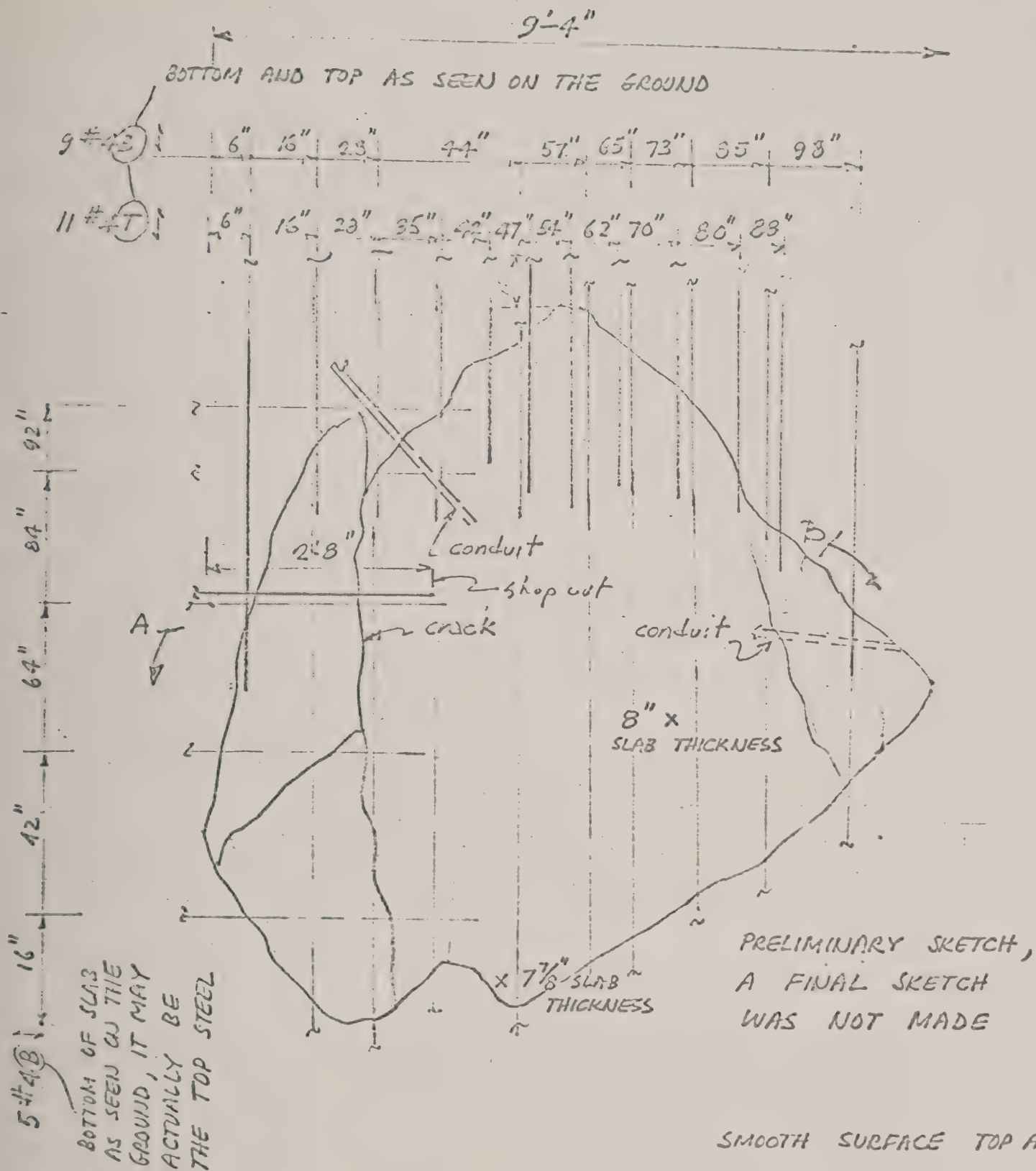
8-2

2#8



7th Fl.

IDENTIFIED AS BEING
E3, E5, F3, OR F5
FROM THE 6th TO 8th FLOOR.

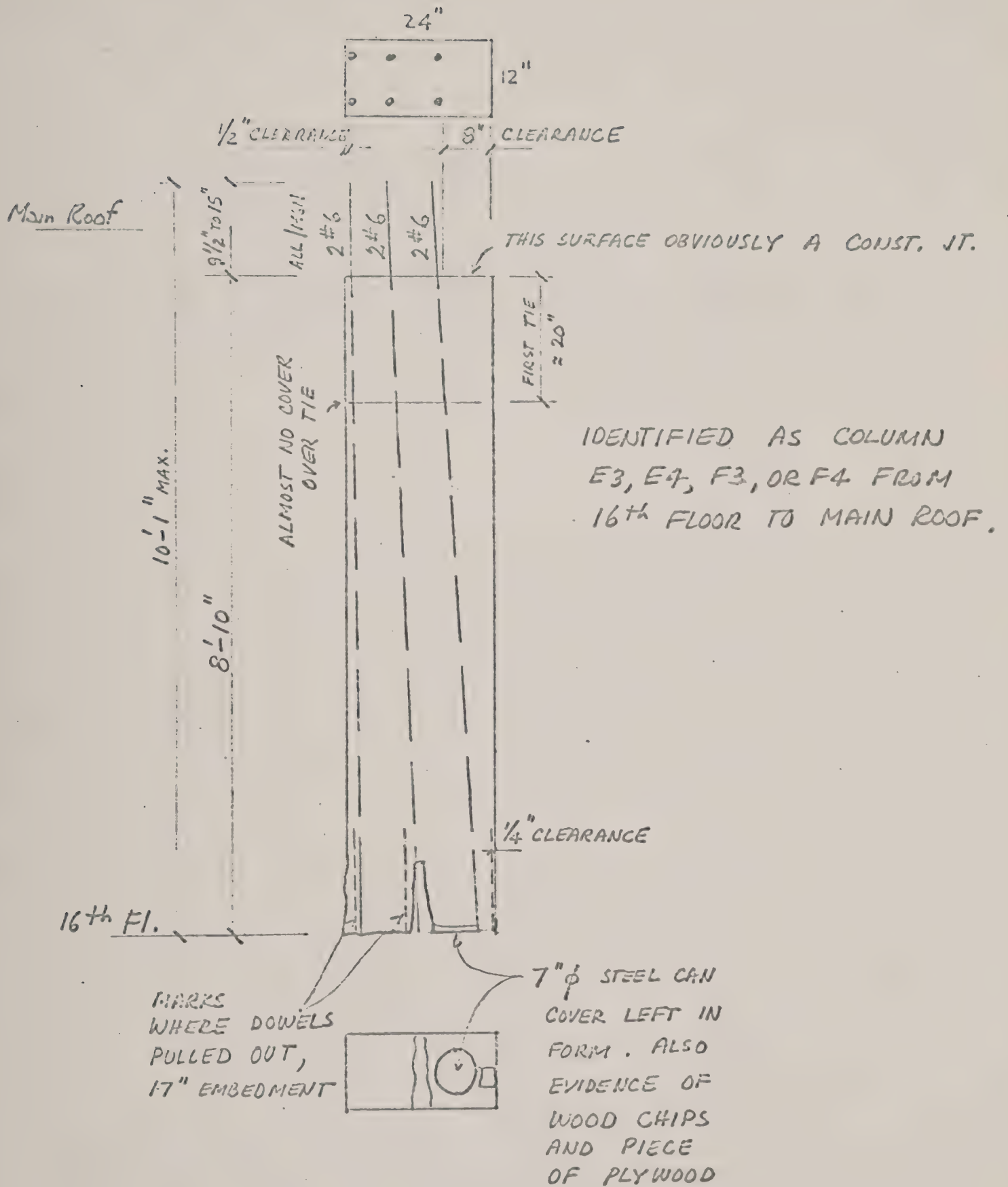


SMOOTH SURFACE TOP AND BOT.

AS SEEN ON
THE GROUND,
THE SLAB MAY
BE FLIPPED
OVER

NO TRACE OF TOP BARS
FROM A TO B

STEEL LAYER 1 NO TOP BARS \rightarrow
2 \downarrow T
3 \downarrow B
4 \leftarrow B

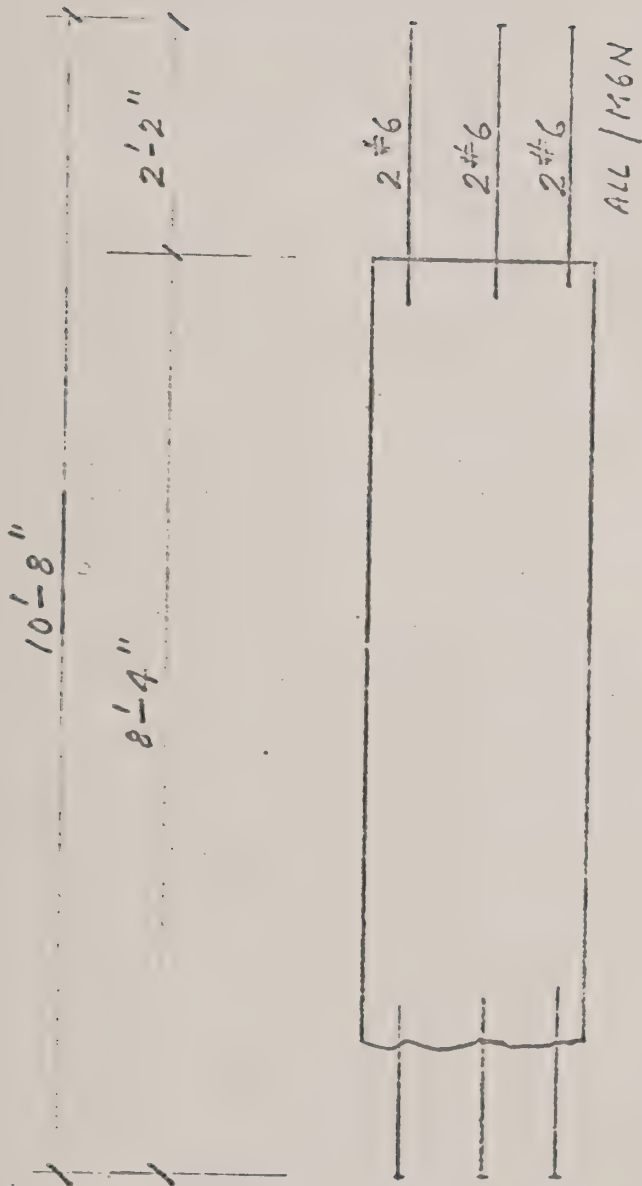


1120 PHOTOGRAPHS

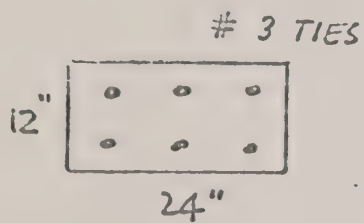


П20 PHOTOGRAPH

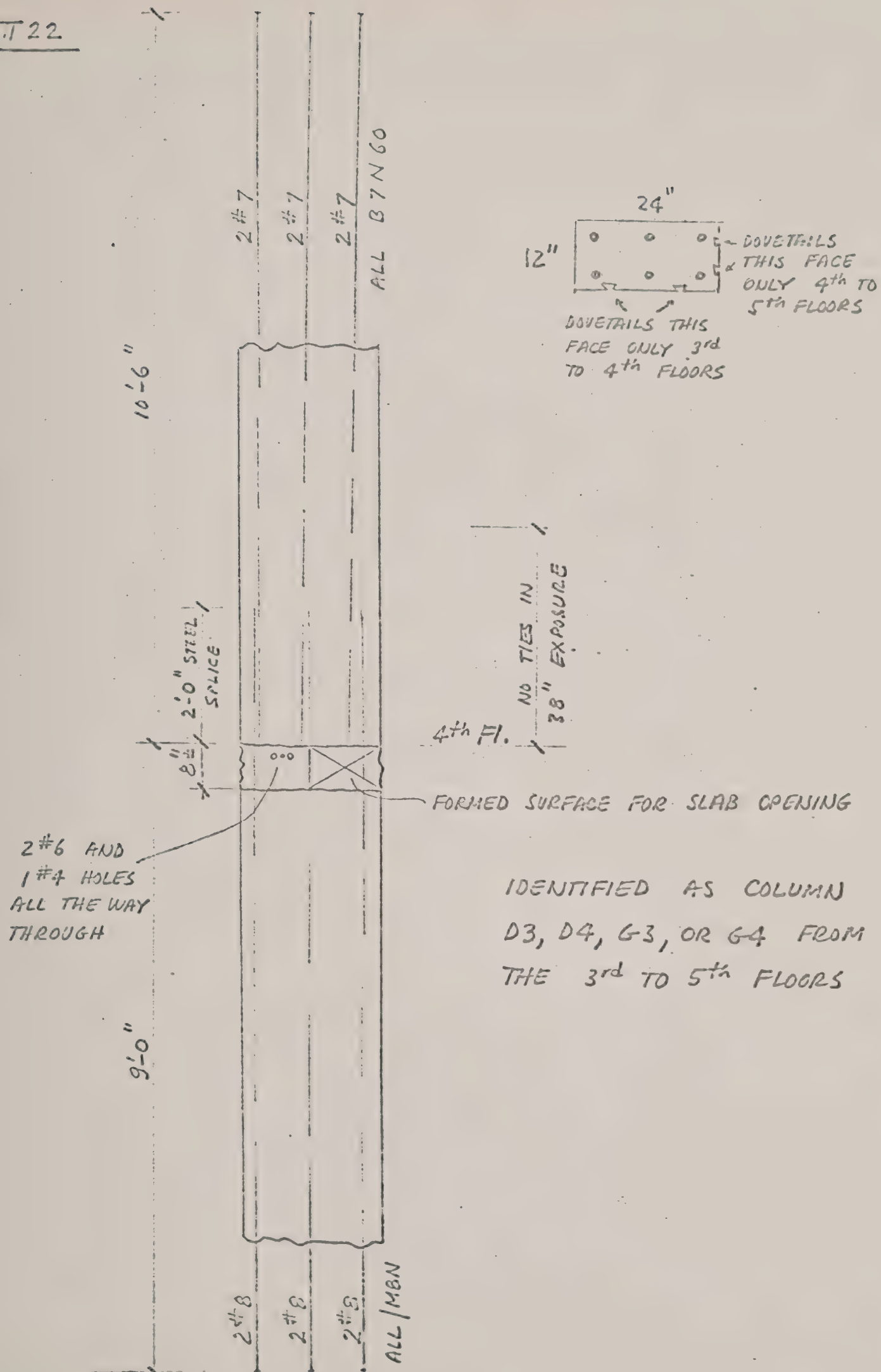




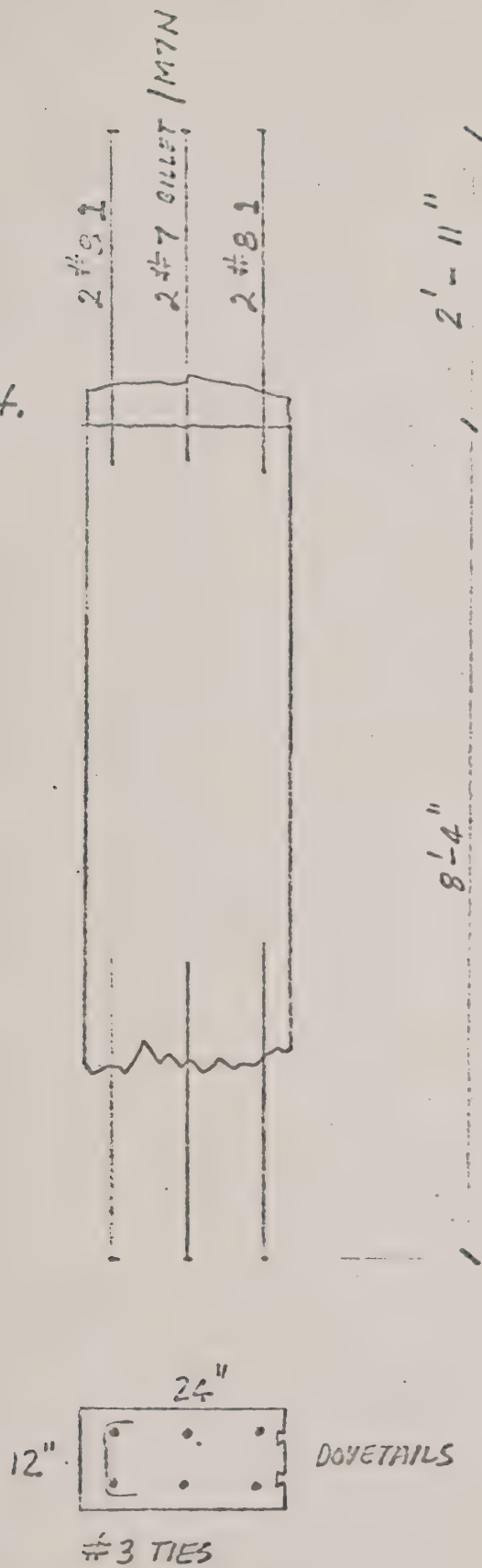
IDENTIFIED AS COLUMN
E3, E5, F3, F5 FROM 15th
TO 16th FLOORS OR
E4, F4 FROM 14th TO
16th FLOORS



T 22

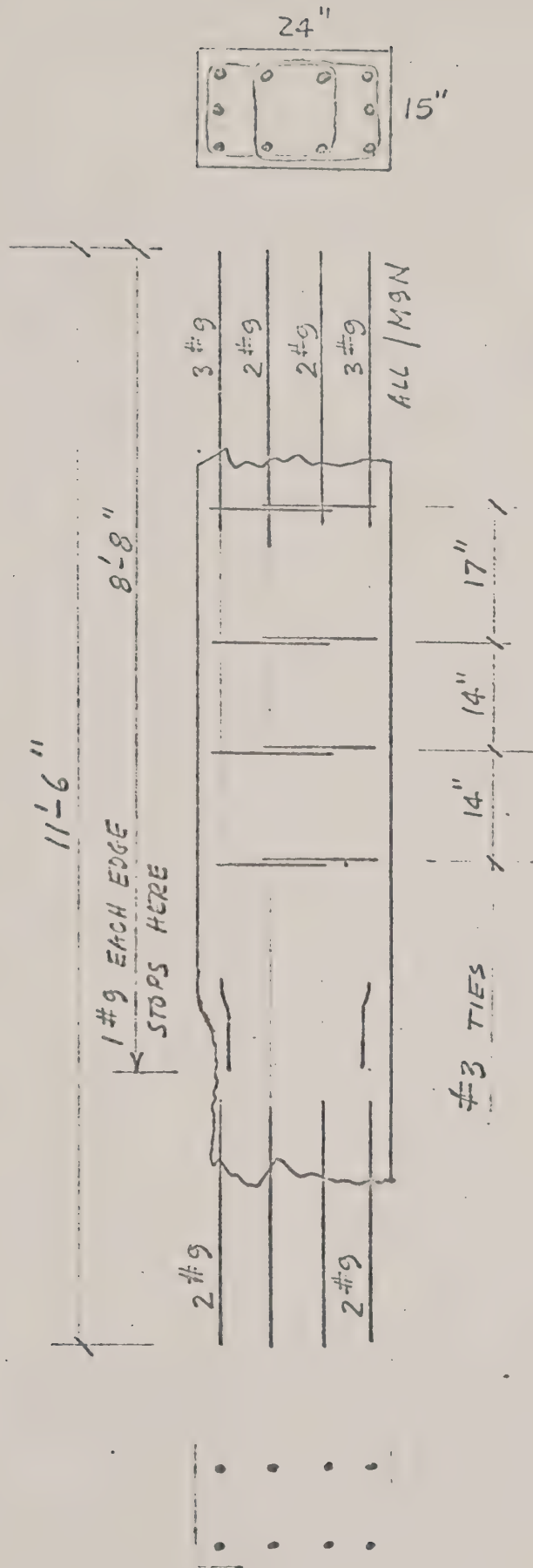


construction jt.



THE FOLLOWING EXTERIOR COLUMNS WERE SPECIFIED TO HAVE 6#7
 D3, D4, G3, G4 FROM 4th TO 7th FLOORS
 D2, G2 FROM 8th TO 9th FLOORS

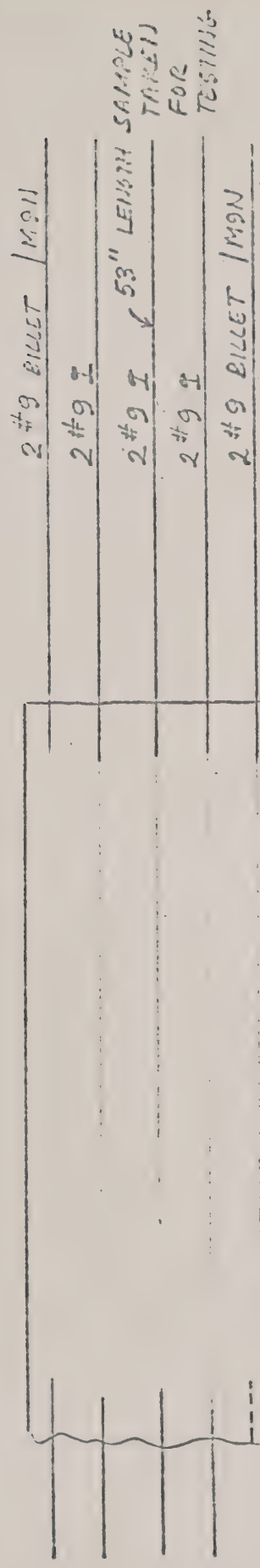
THE FOLLOWING EXTERIOR COLUMNS WERE SPECIFIED TO HAVE 6#8
 D3, D4, G3, G4 FROM 3rd TO 4th FLOORS
 C6, H6, H7 FROM 10th TO 11th FLOORS



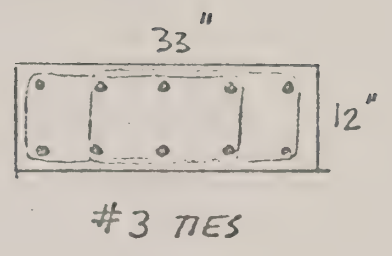
IDENTIFIED AS COLUMN E4 OR F4.
FROM 8th TO 9th FLOOR.

≈ 15'-3"

6'-0"

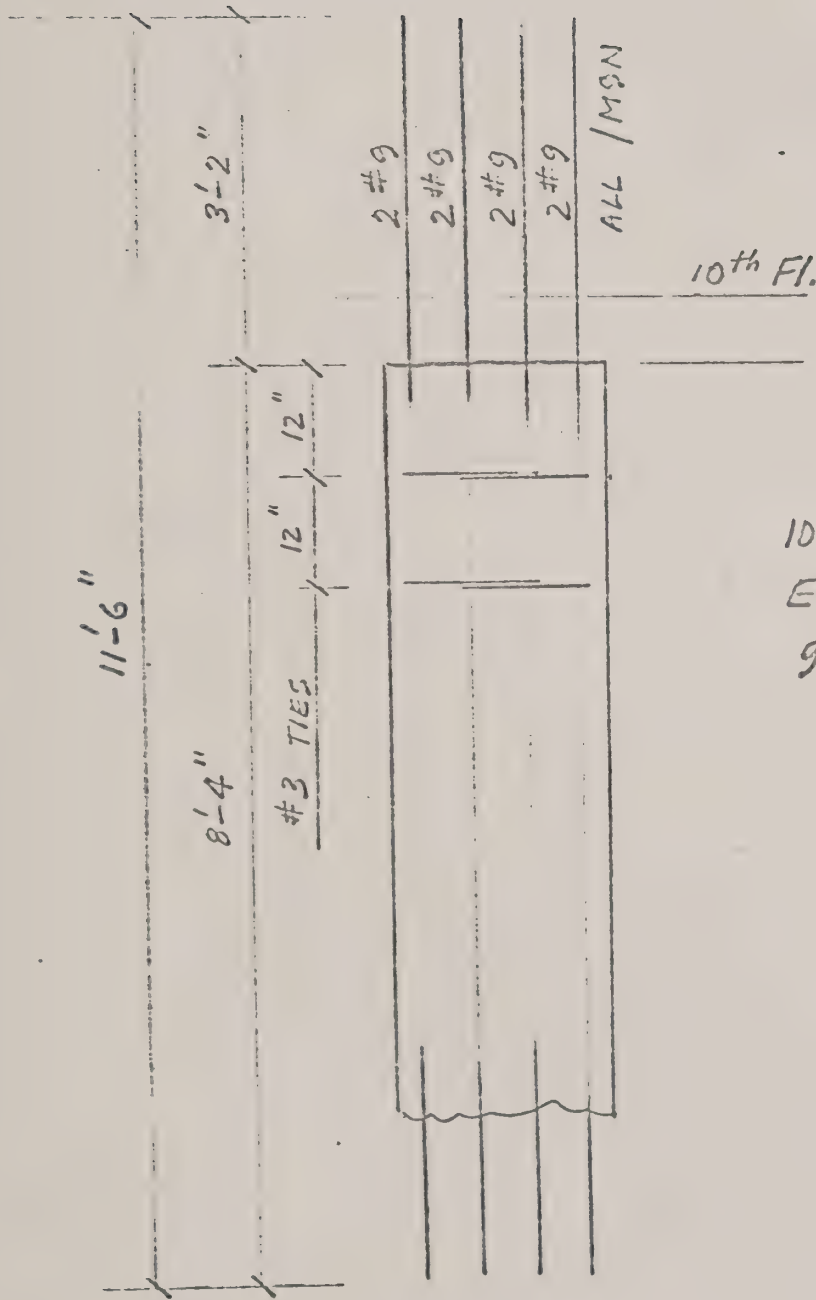
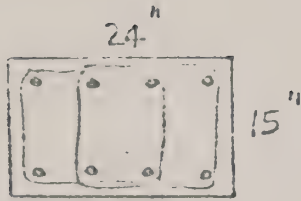


22"
MARK FOR
VERTICAL
STEEL SPLICE

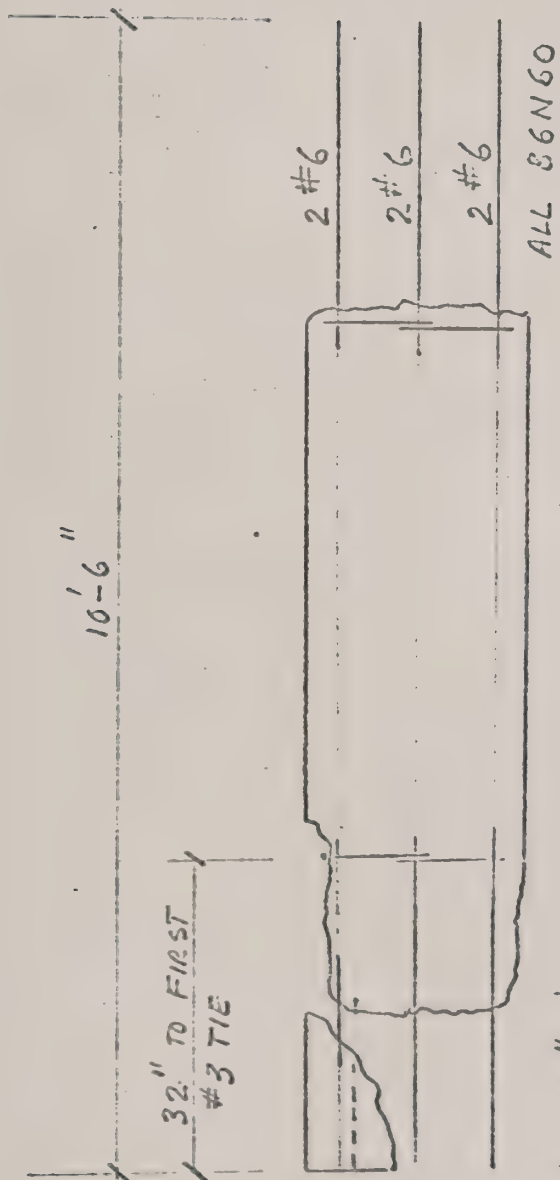
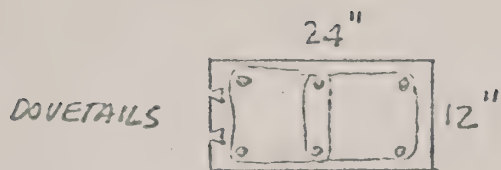


IDENTIFIED AS COLUMN
D3, D4, G3, OR G4 FROM
1ST BSMT. TO GROUND FLOOR

T26



IDENTIFIED AS COLUMN
E4 OR F4 FROM
9th TO 10th FLOORS



IDENTIFIED AS COLUMN

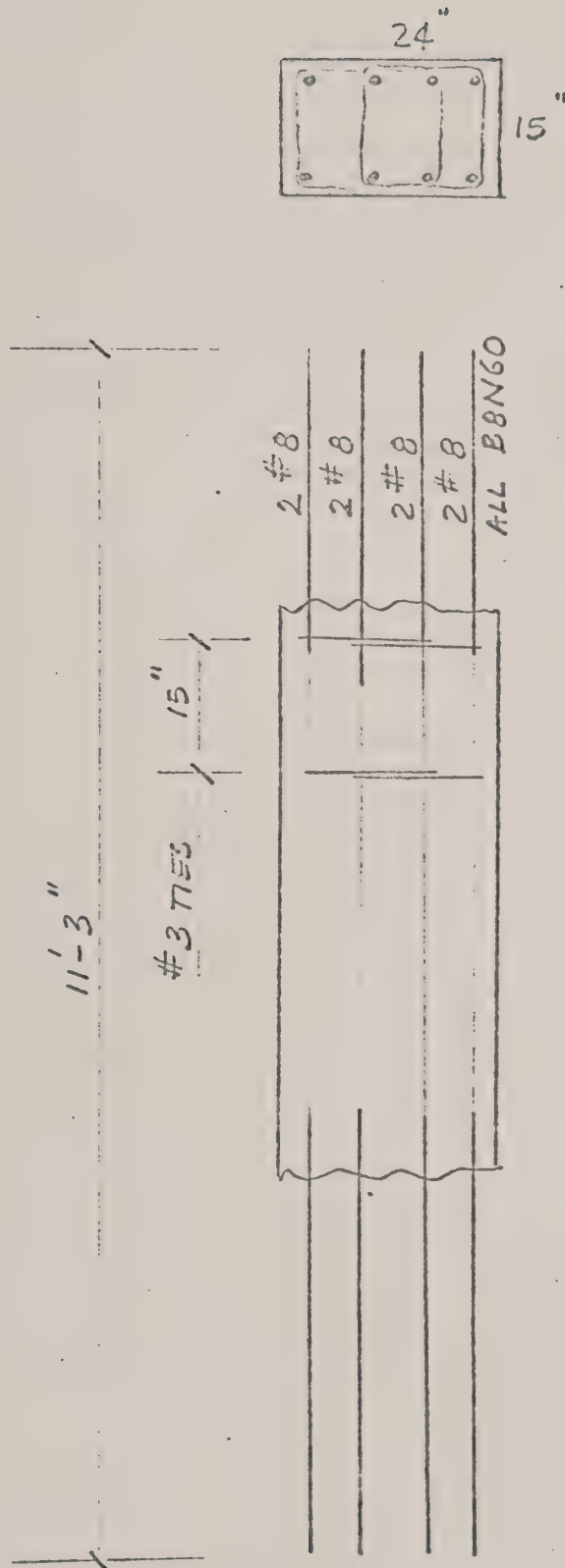
D3, D4, G3, G4 7th → 16th FL

OR

D2, G2 9th → 16th FL

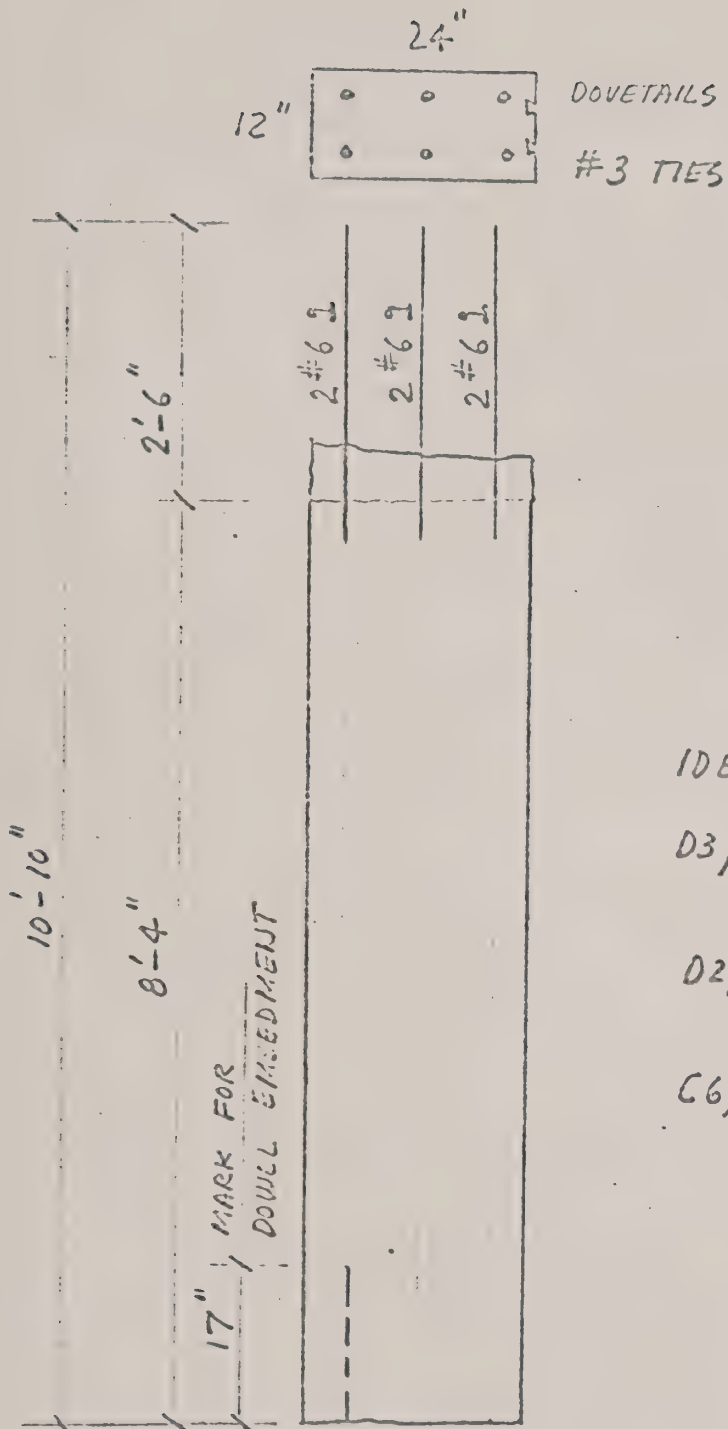
OR

C6, H6, H7 11th → 16th FL



IDENTIFIED AS COLUMN
E4 OR F4 9th TO 10th
OR 10th TO 11th FLOORS

Π30



IDENTIFIED AS COLUMN

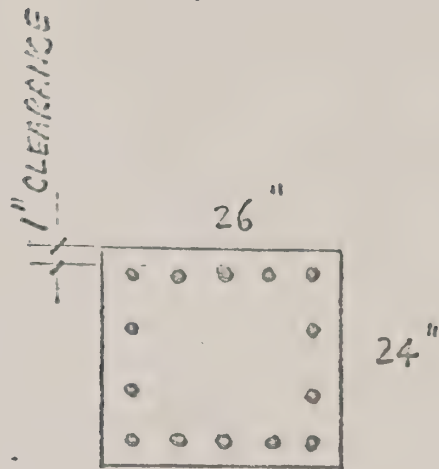
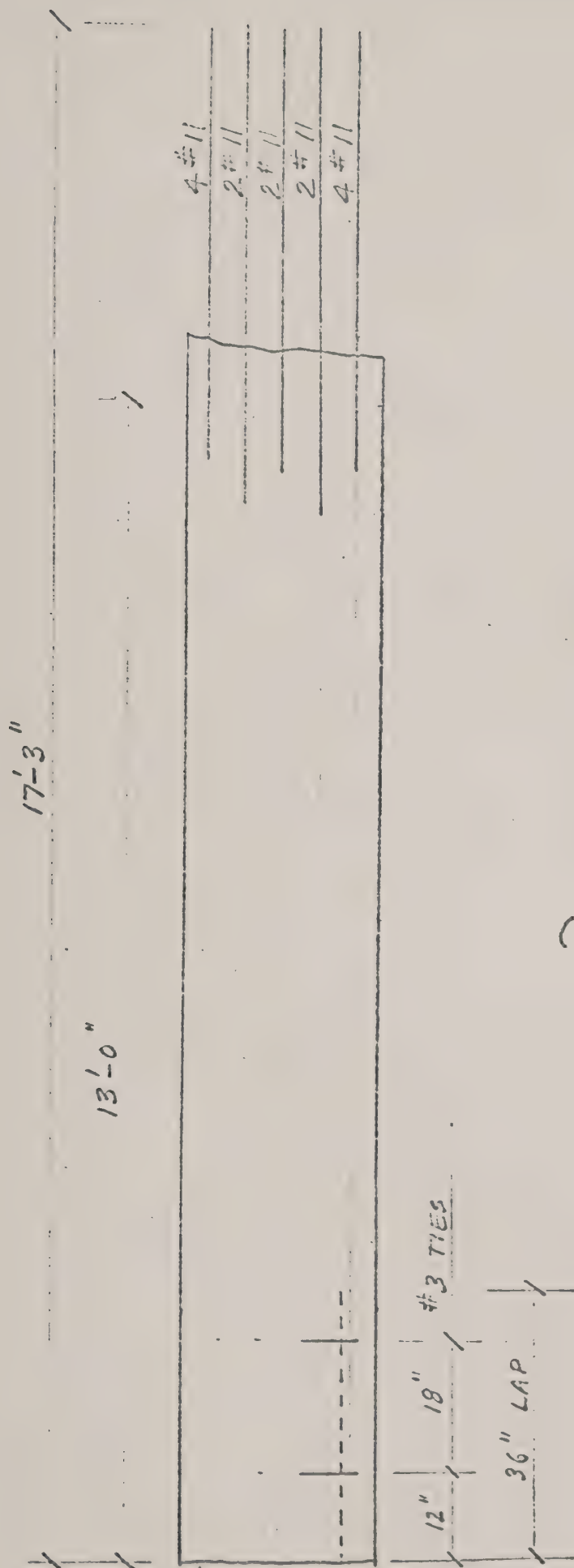
D3, D4, G3, G4 7th → 16th FL.

OR

D2, G2 9th → 16th FL.

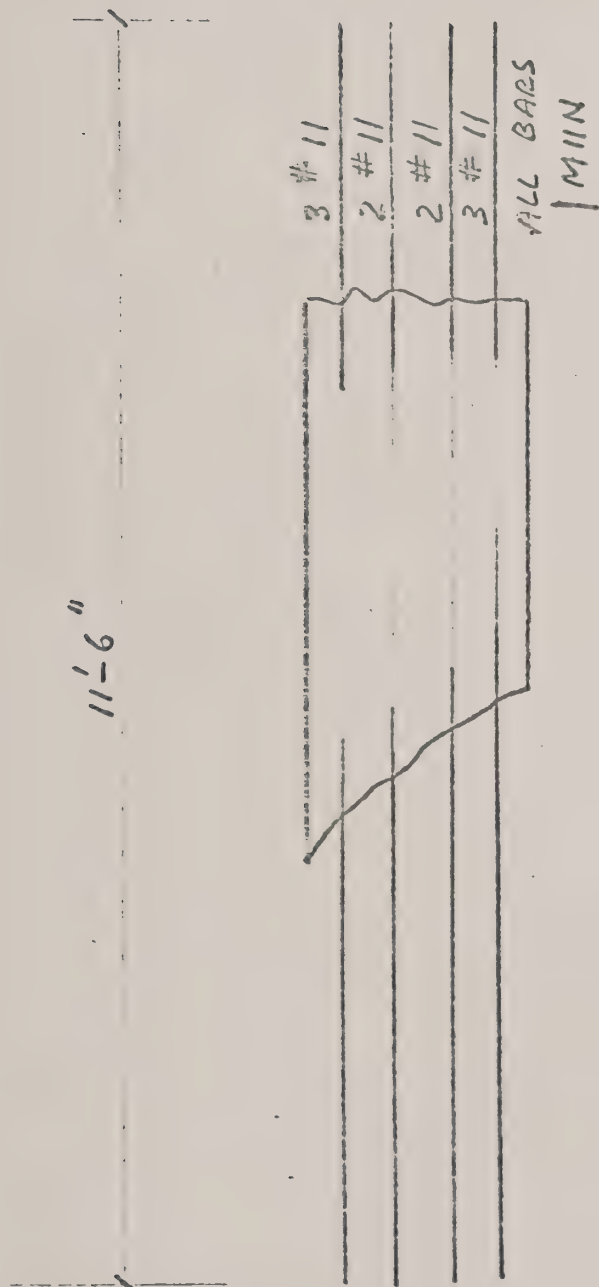
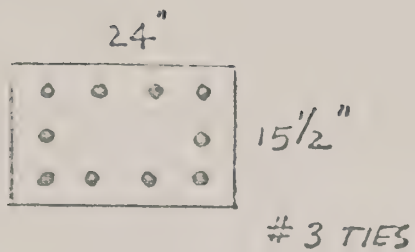
OR

C6, H6, H7 11th → 16th FL.



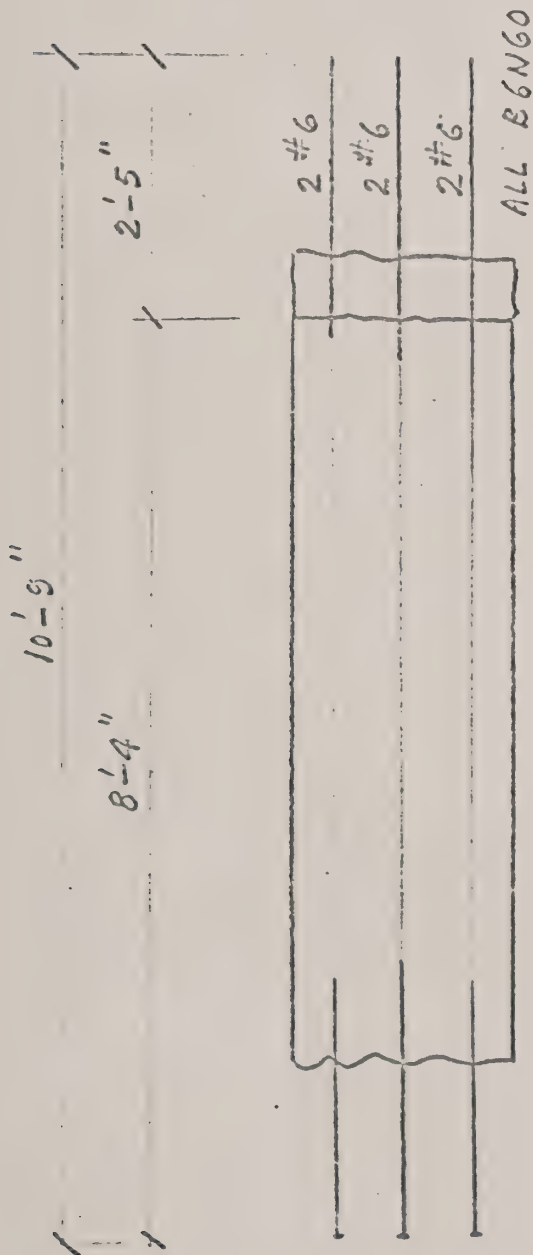
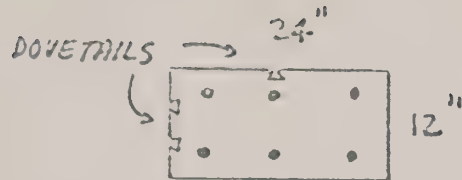
IDENTIFIED AS COLUMN
E3, E5, F3, OR F5 FROM
FOOTING TO 1ST BASEMENT
(EXCEPT THAT THOSE COLS
SHOULD BE 24"x27")

PI 32



IDENTIFIED AS COLUMN
E3, E5, F3, OR F5 FROM
8th TO 9th FLOORS

IT 33



IDENTIFIED AS COLUMN

D3, D4, G3, G4 7th → 16th FL

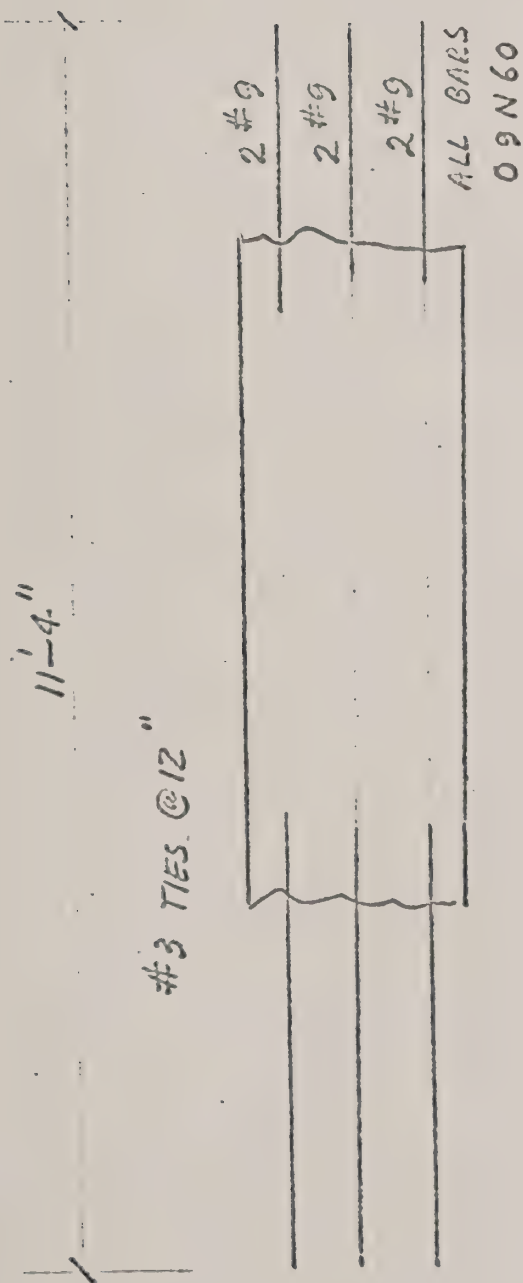
OR

D2, G2 9th → 16th FL.

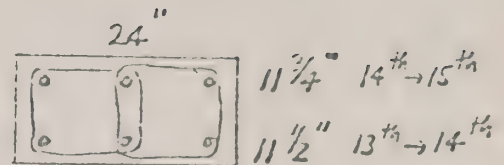
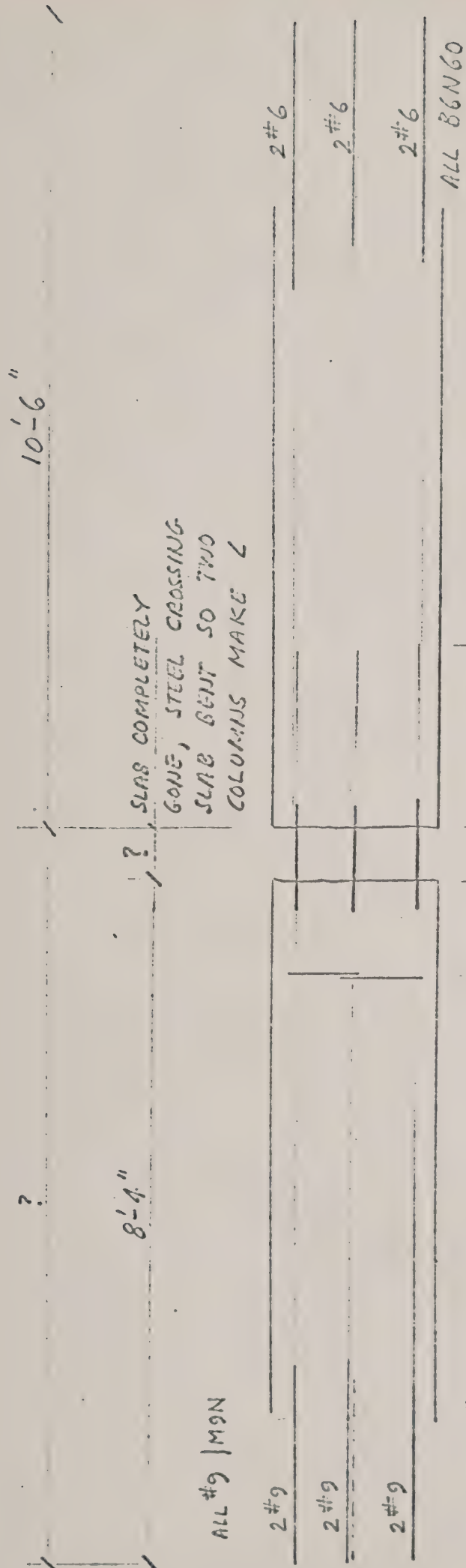
OR

C6, H6, H7 11th → 16th FL.

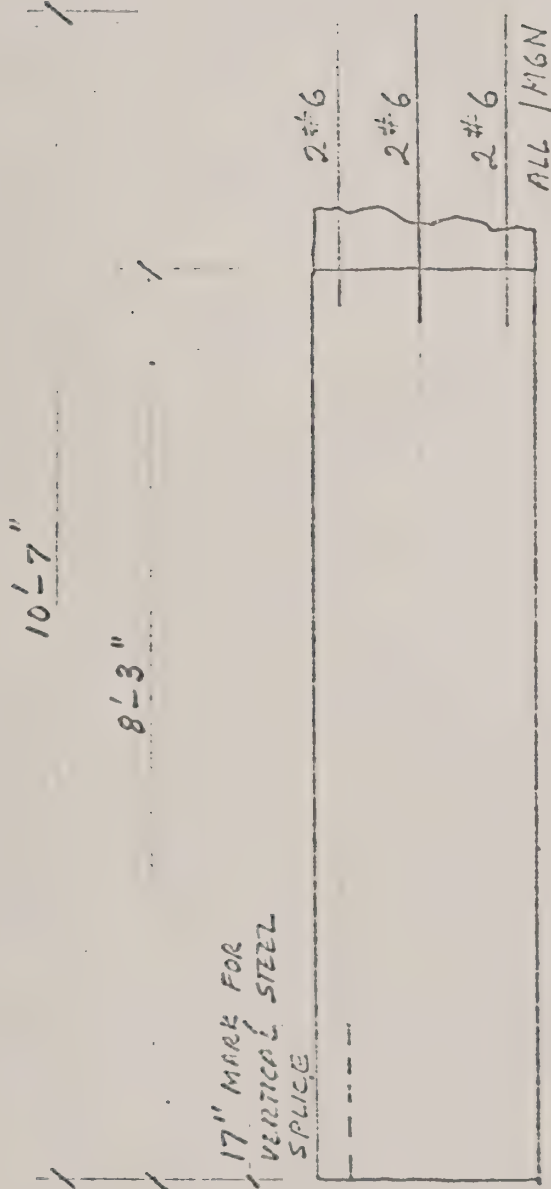
TT 34



IDENTIFIED AS
COLUMN D2 OR G2
FROM 7th TO 8th FLOORS



IDENTIFIED AS EITHER
COLUMN E4 OR F4
FROM 13th TO 15th FLOORS



IDENTIFIED AS COLUMN

D3, D4, G3, G4 7th → 16th FL.

OR

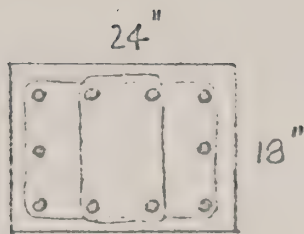
D2, G2 9th → 16th FL

OR

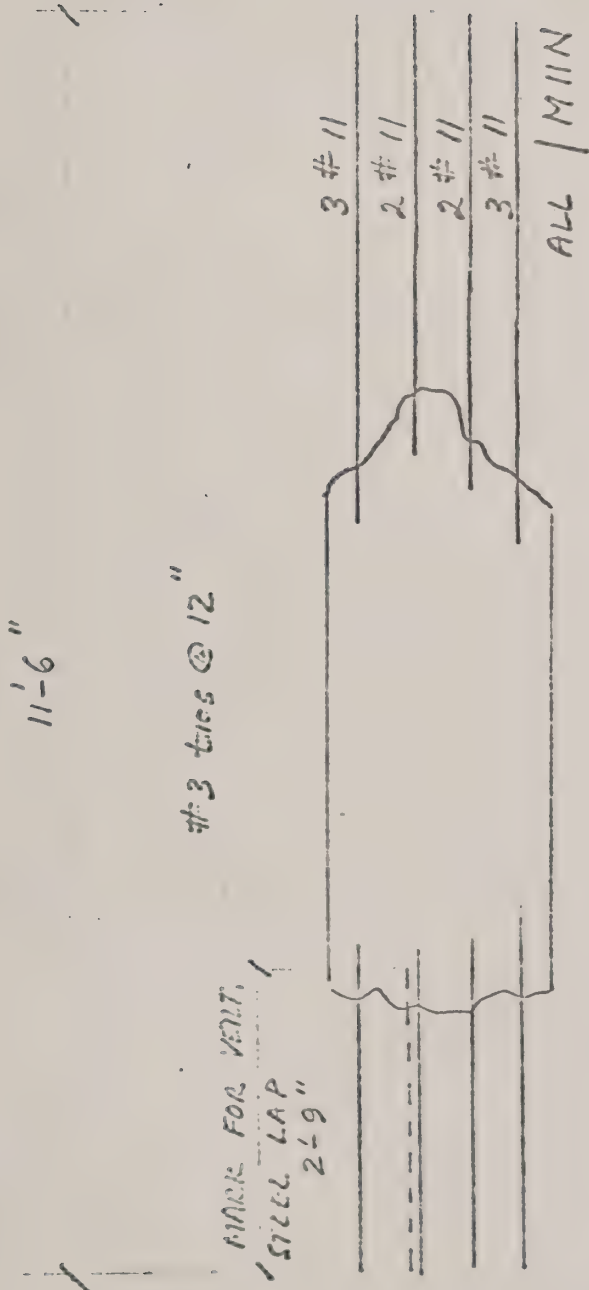
C6, H6, H7 11th → 16th FL

NO TIE IN
AT LEAST 23"

T 37



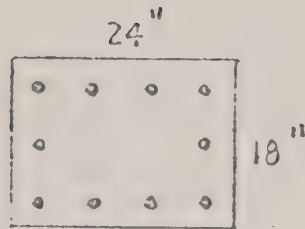
IDENTIFIED AS COLUMN
E3, F3, E5, OR F5
FROM 7th TO 8th FLOORS



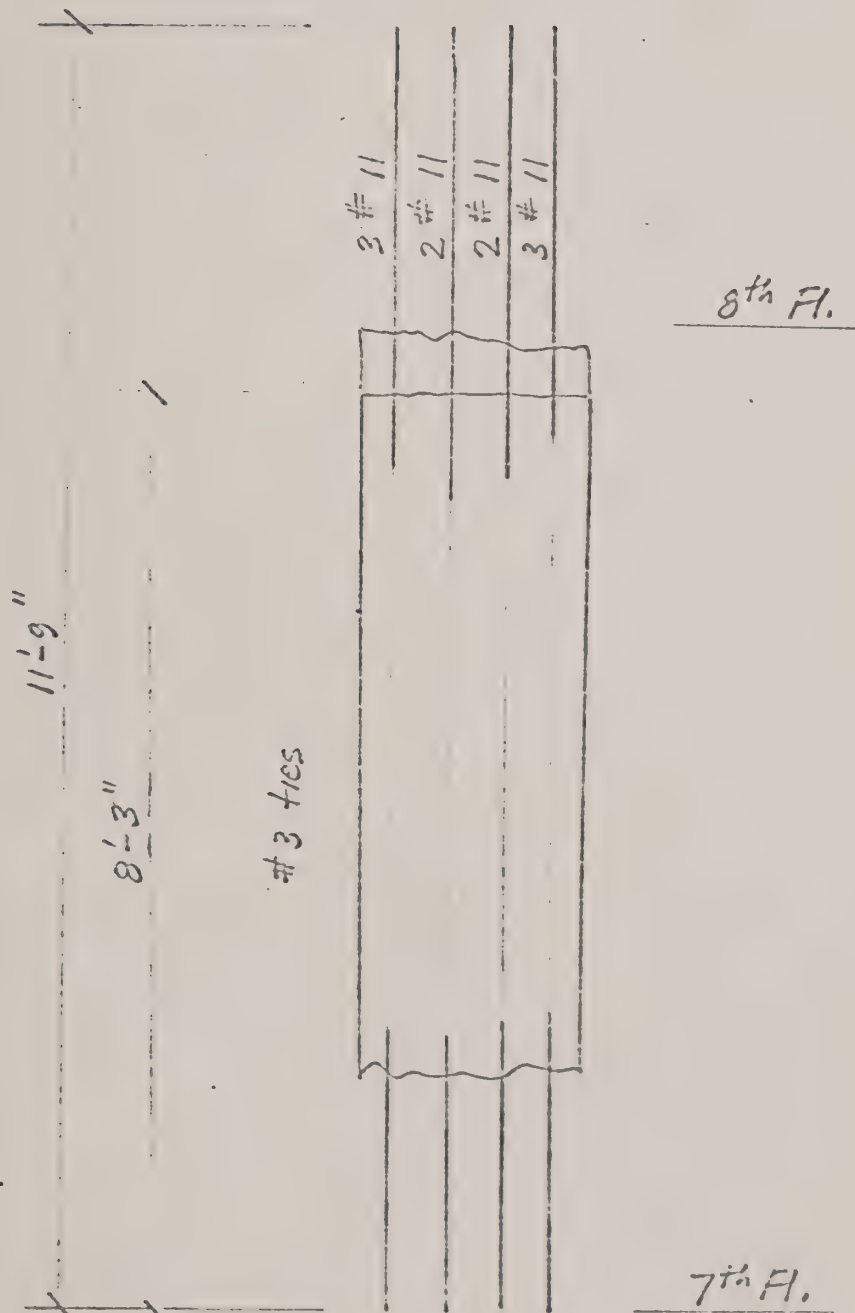
8th Fl.

7th Fl.

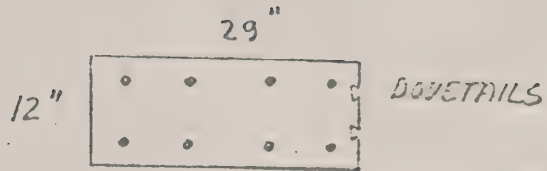
π 39



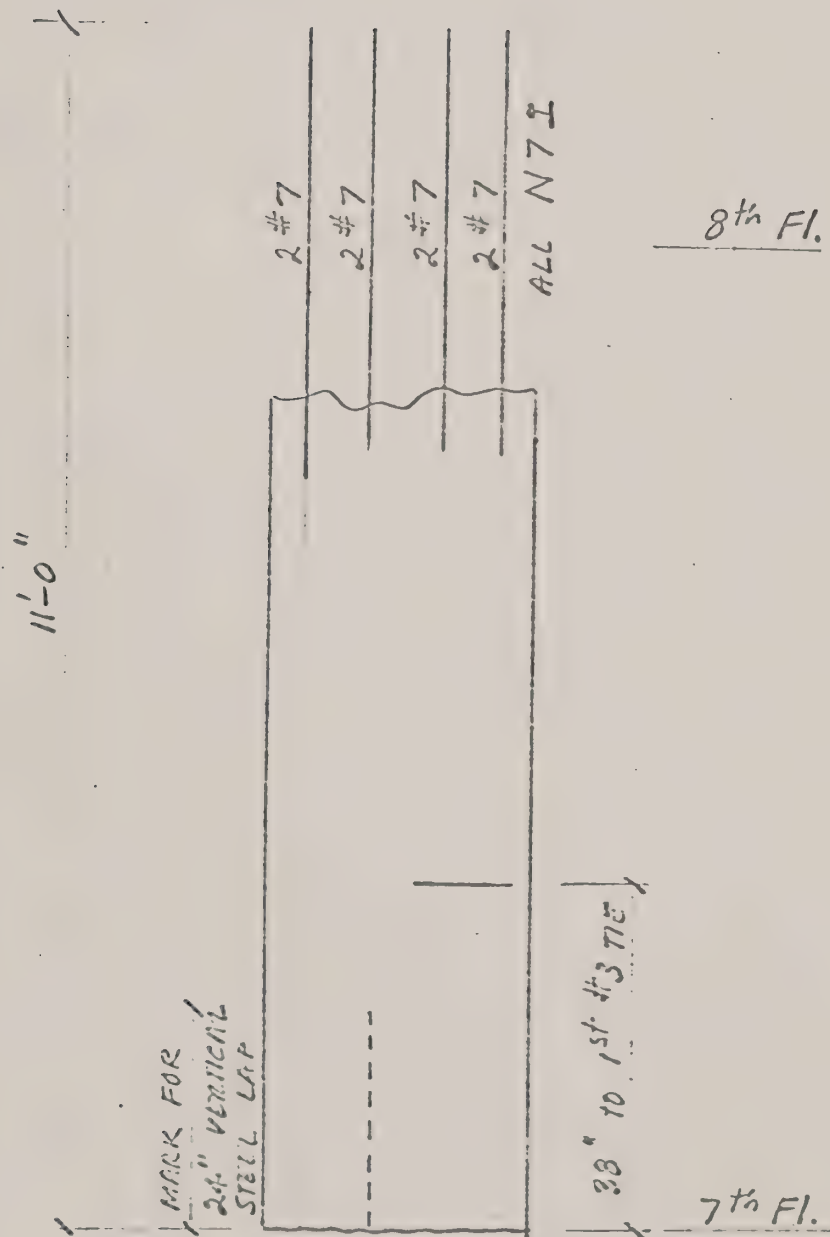
IDENTIFIED AS COLUMN
E3, F3, E5, OR F5
FROM 7th TO 8th FLOORS



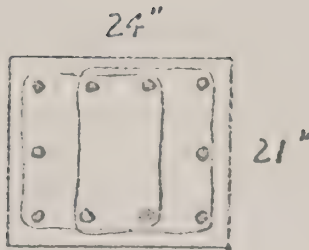
1146



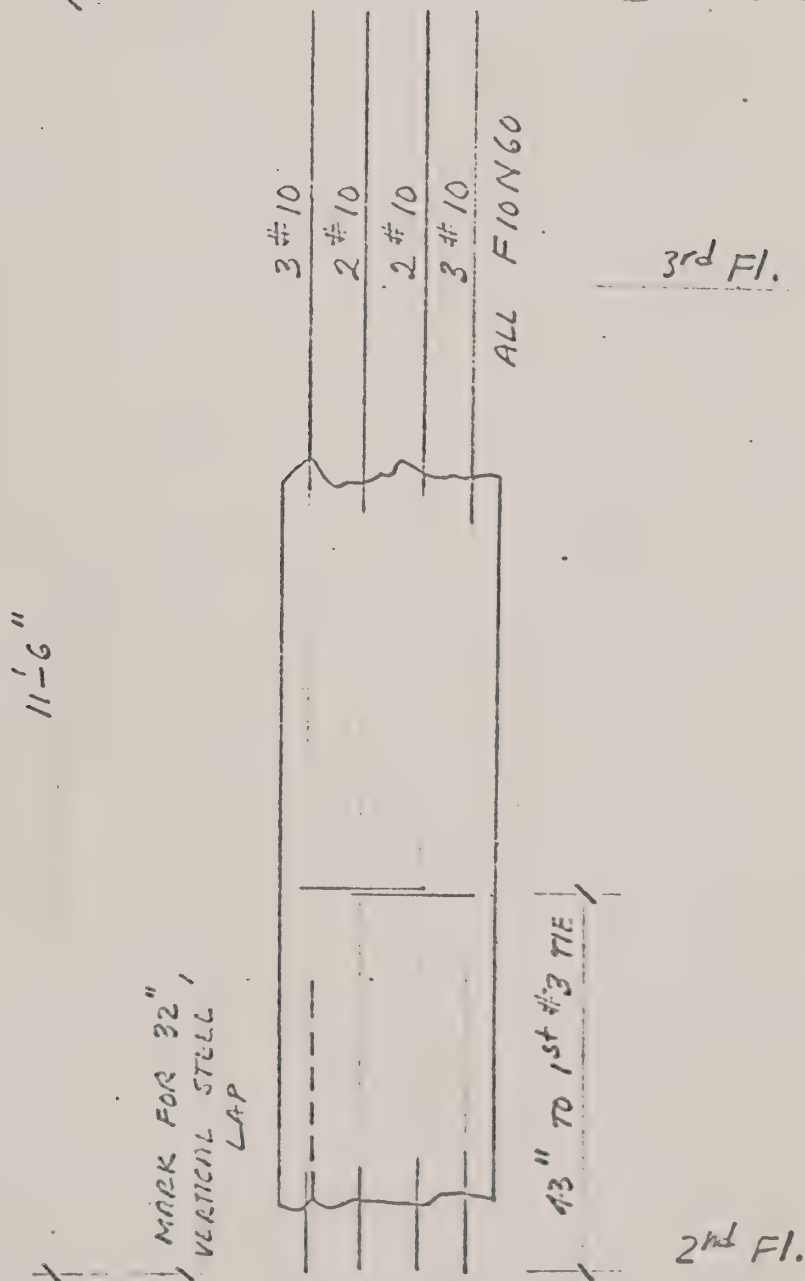
IDENTIFIED AS COLUMN
E2 OR F2 FROM
7th TO 8th FLOORS



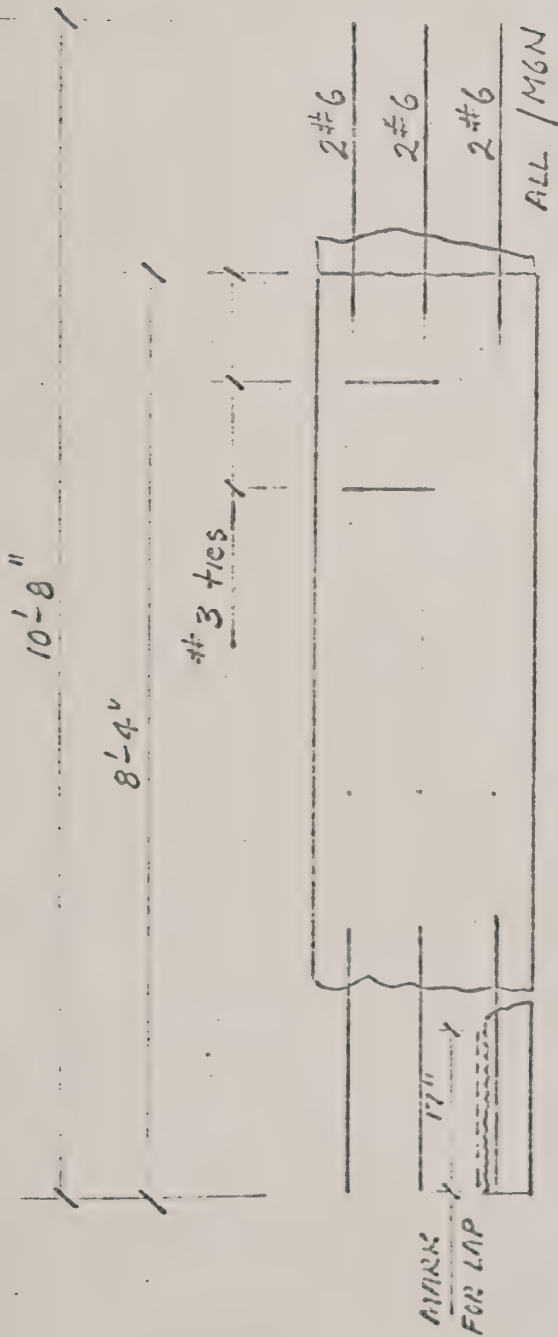
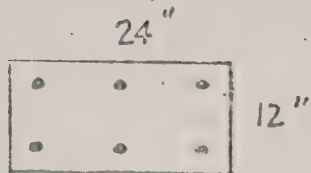
Π 47



IDENTIFIED AS COLUMN
E4 OR F4 FROM
2nd TO 3rd FLOORS



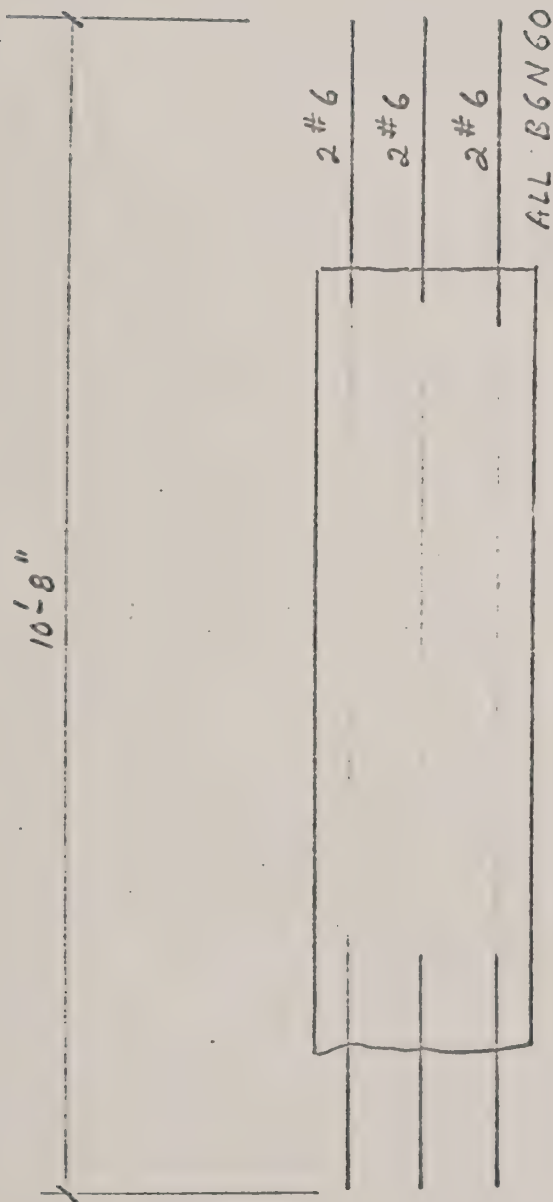
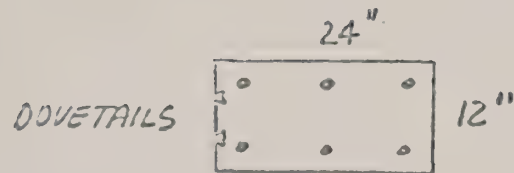
1143



IDENTIFIED AS COLUMN
E3, E5, F3, F5 15th → 16th FL
OR
E4, F4 14th → 16th FL.

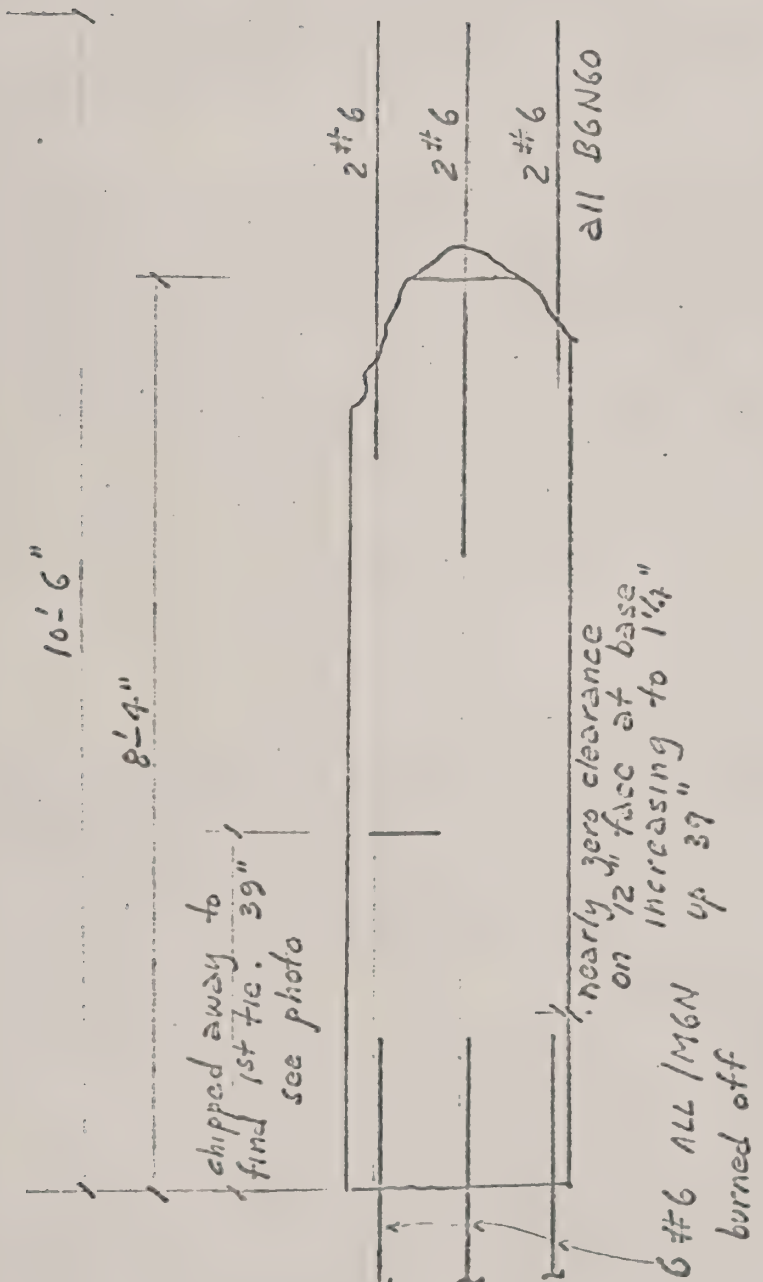
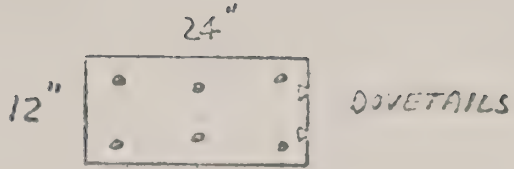
NO TIES FOR
AT LEAST 39"

π 49



IDENTIFIED AS COLUMN
D3, D4, G3, G4 7th → 16th FL.
OR
D2, G2 9th → 16th FL.
OR
C6, H6, H7 11th → 16th FL.

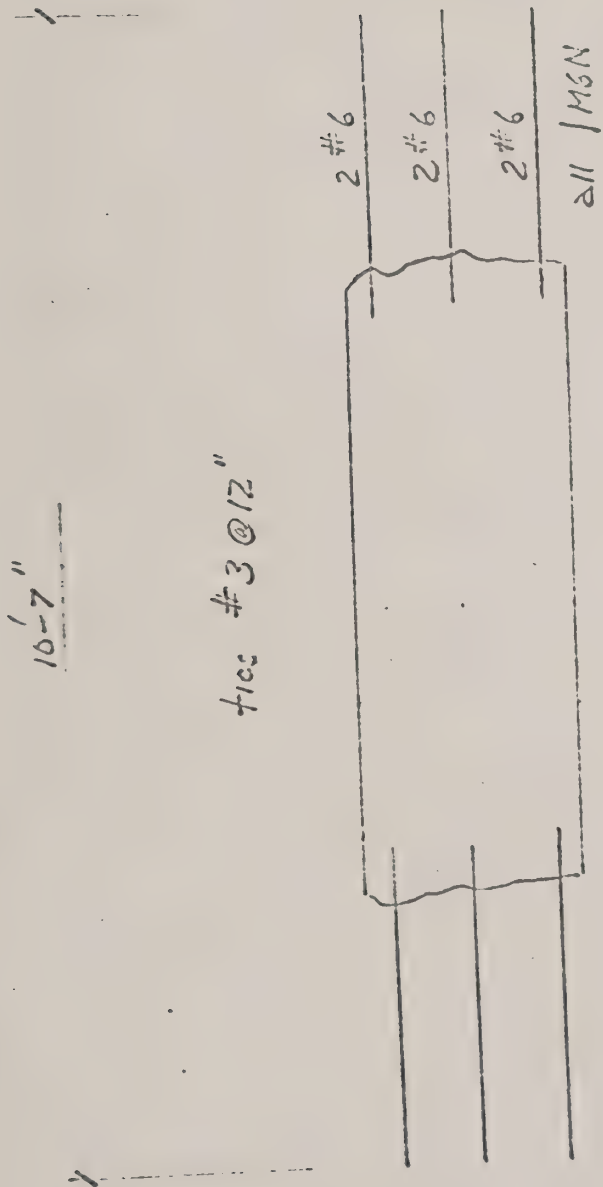
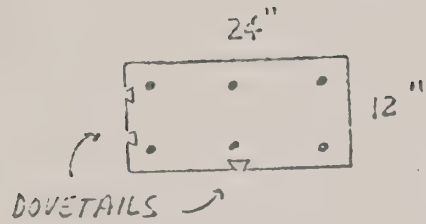
π 53



Π53 PHOTOGRAPHS



TT 54



IDENTIFIED AS COLUMN
 D3, D4, G3, G4 7th → 16th FL.
 OR
 D2, G2 9th → 16th FL
 OR
 C6, H6, H7 11th → 16th FL

Π 55

≈ 9'-0"

ROUNDED EDGE OF SLAB

STEEL LAYERS

1	→	T
2	→	T
3	→	S
4	→	S

IDENTIFIED AS BALCONY SLAB, TYPICAL FLOOR, SOUTHWEST CORNER

≈ 3'-0"

4#4 @ 5"
7'-4" LONG

6#4T
84N60

4#4B

2#6B / M6N
(SHOW ALL
OTHER STEEL)

1/2" 90° CLIP

3/4" x 3/4" DRIP NOTCH

BOTTOM SURFACE UP
THICKNESS 5 1/2"
7 1/2" AROUND
OPENING

≈ 6'-5"

6#6 / M6N
BARS INTO
COL. OVER.
ALSO NOBS
OF #4 SHOP
CUT (SEE
PHOTO)

6"
10"

#4 #4T

5'-5 1/4" 4#6 / M6N

7'-4"

APPEAR TO HAVE
BEEN BENT UP INTO
PARAPET

3#4B

4#6 / M6N

5#4T

17#4T

44"

16"

16"

18"

12"

26"

14"

20"

10"

20"

12"

17"

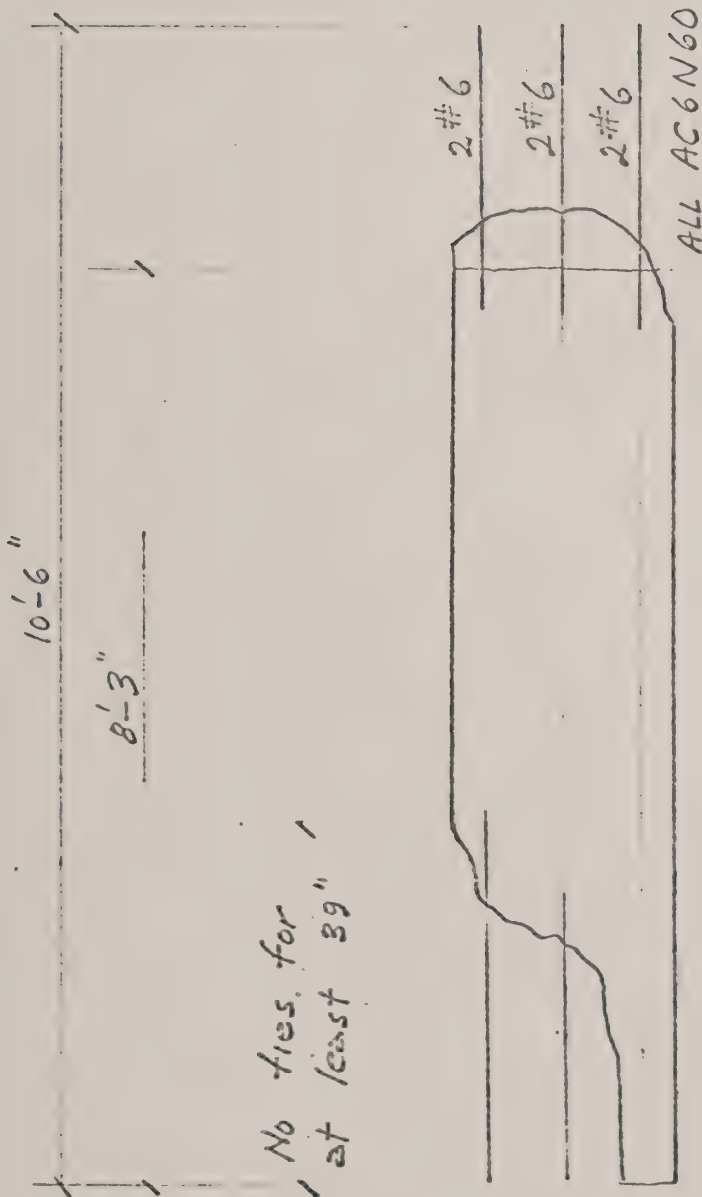
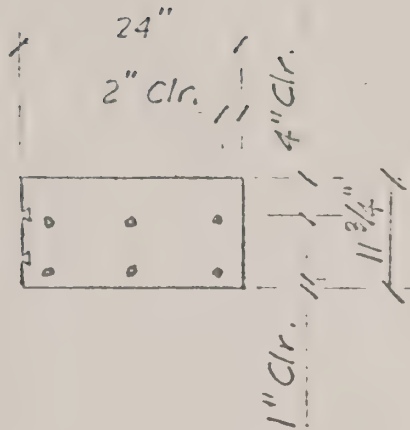
6"

Π 55 PHOTOGRAPH



1156

DETAILS

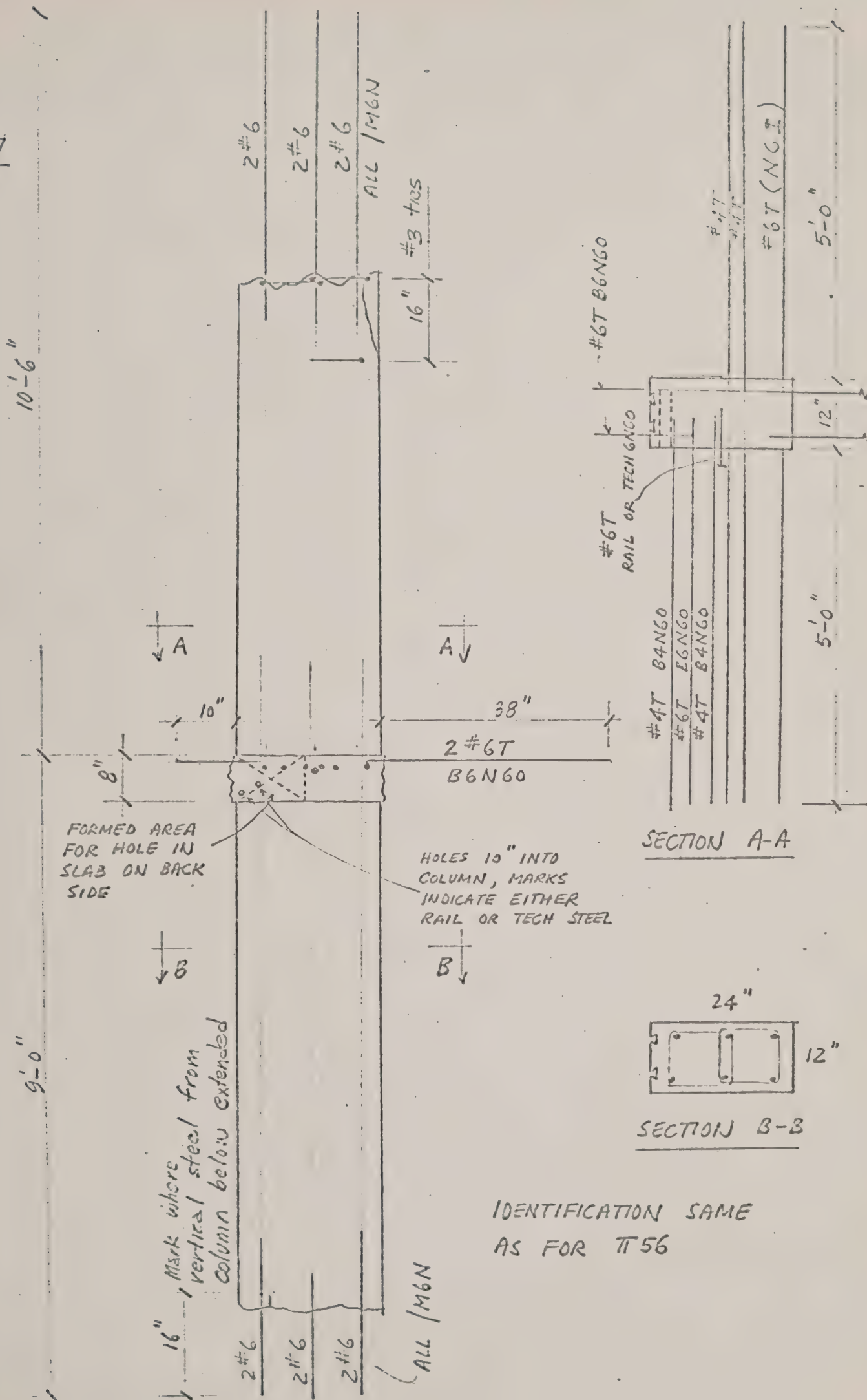


IDENTIFIED AS COLUMN
D3, D4, G3, G4 7th → 16th FL.

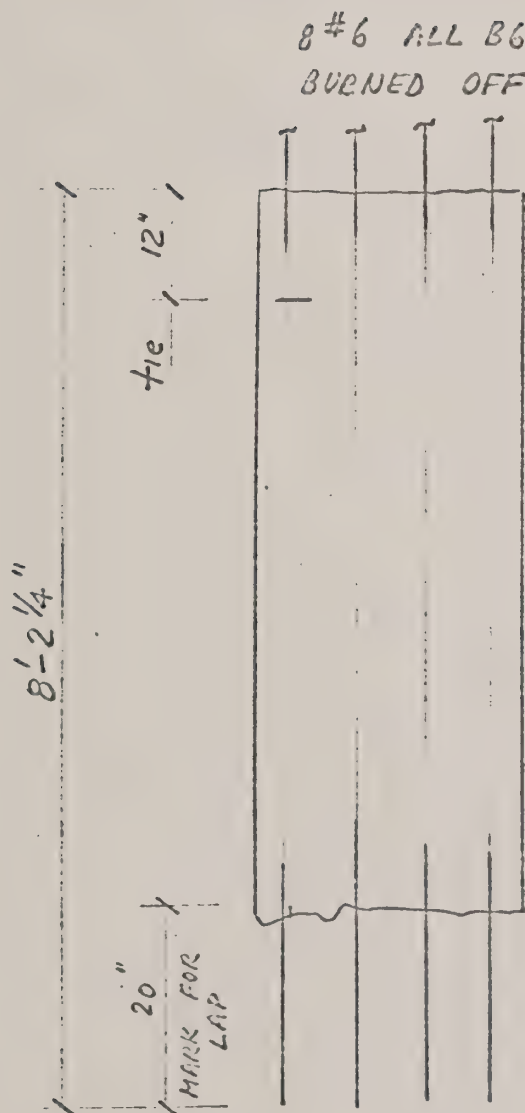
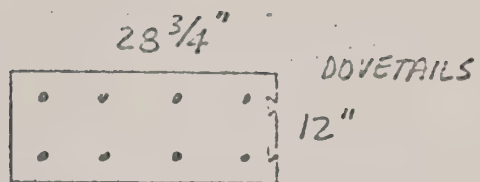
OR
D2, G2 9th → 16th FL.

OR
C6, H6, H7 11th → 16th FL.

Π 57

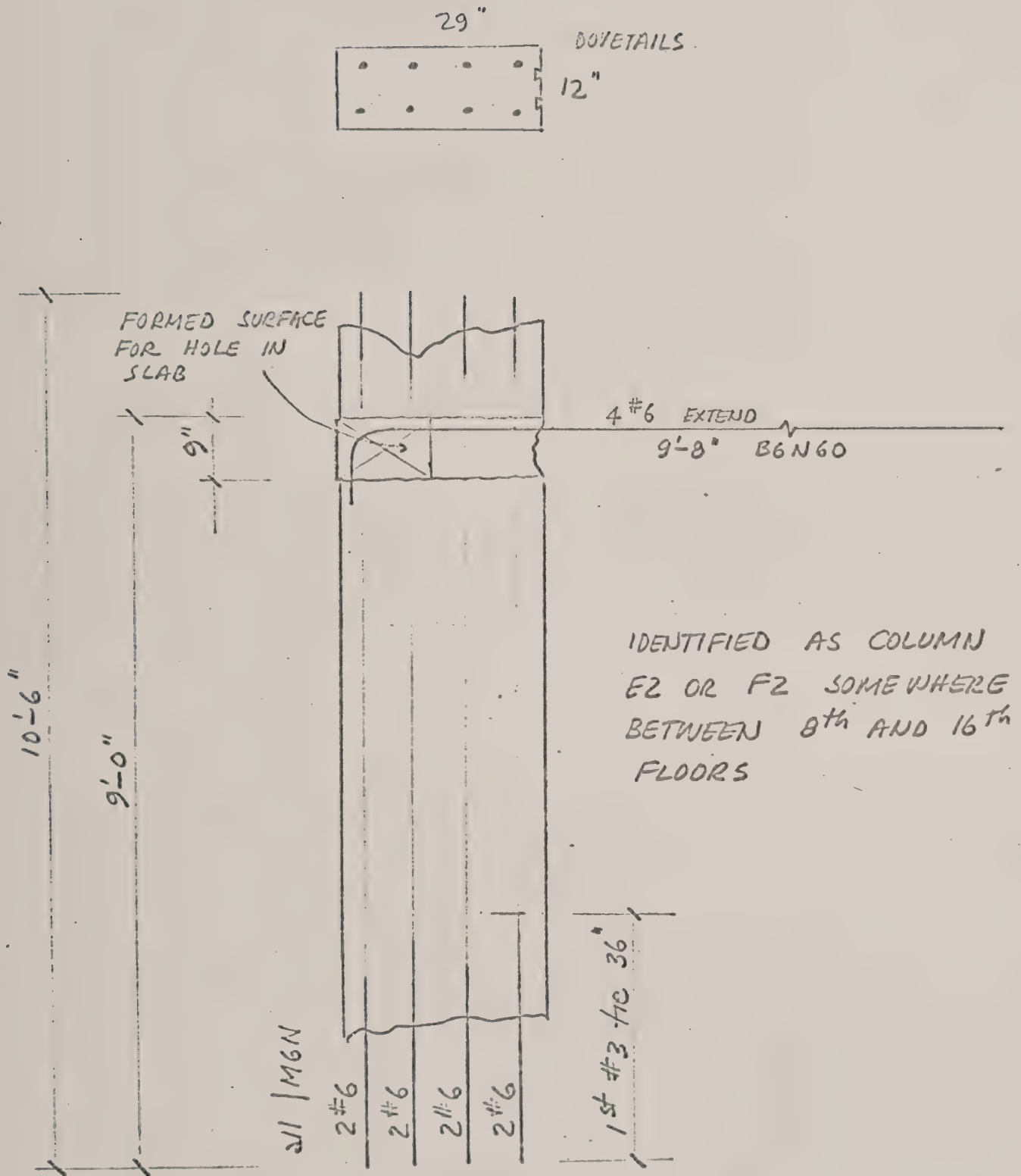


TT 53

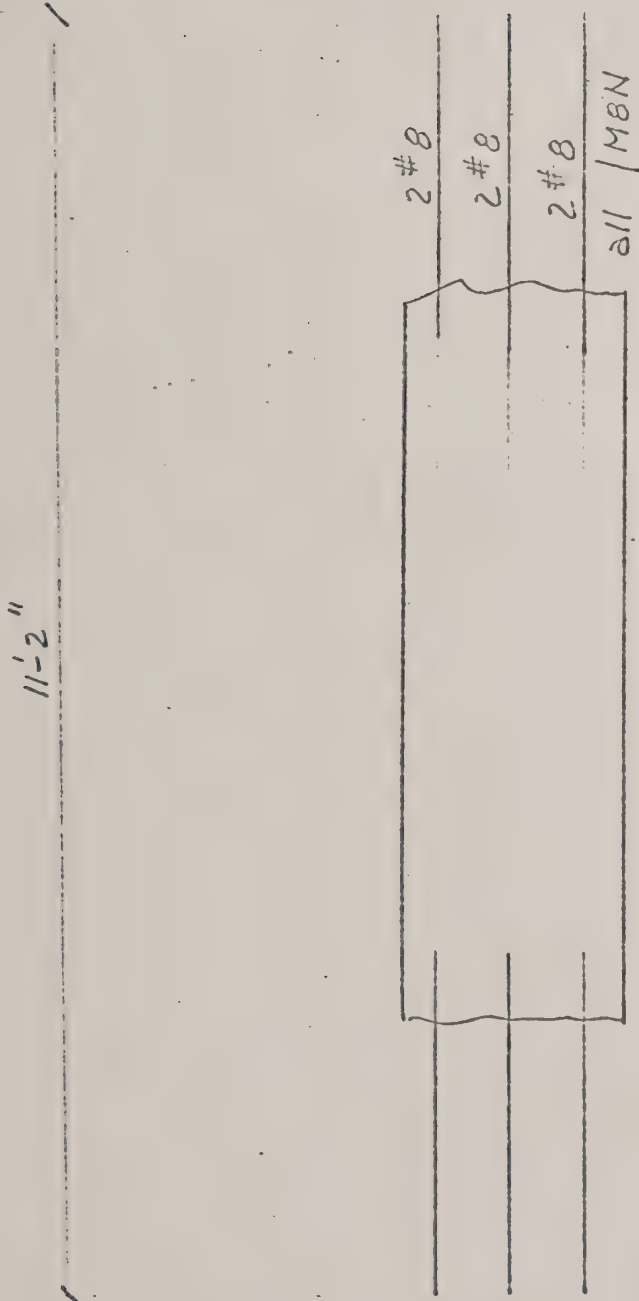
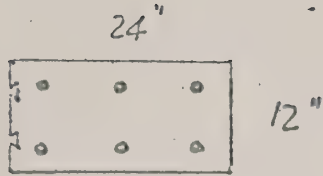


IDENTIFIED AS COLUMN
E2 OR F2 SOMEWHERE
BETWEEN 8th AND 16th
FLOORS.

TT 59

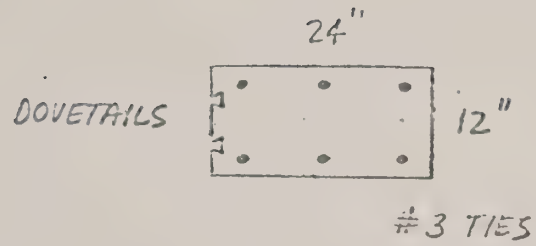


π60

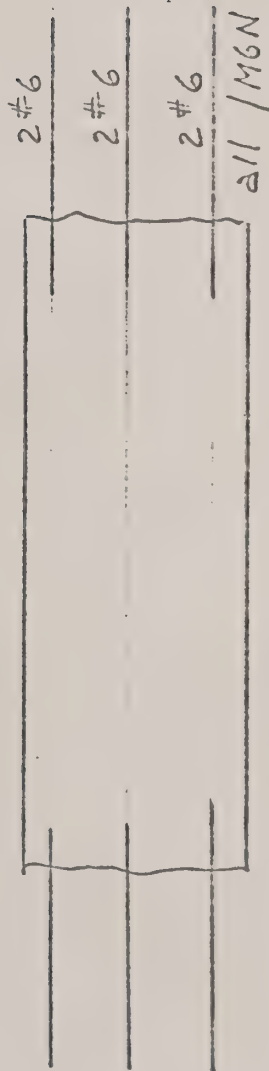


COULD BE COLUMN
C6, H6, OR H7 FROM
10th TO 11th FLOORS OR
D3, D4, G3, OR G4 FROM
3rd TO 4th FLOORS.

TT 61



9'-8"



COULD BE COLUMN

D3, D4, G3, G4 7th → 16th FL.

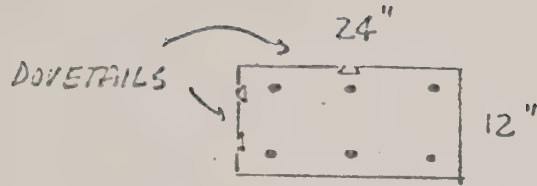
OR

D2, G2 9th → 16th FL.

OR

C6, H6, H7 11th → 16th FL.

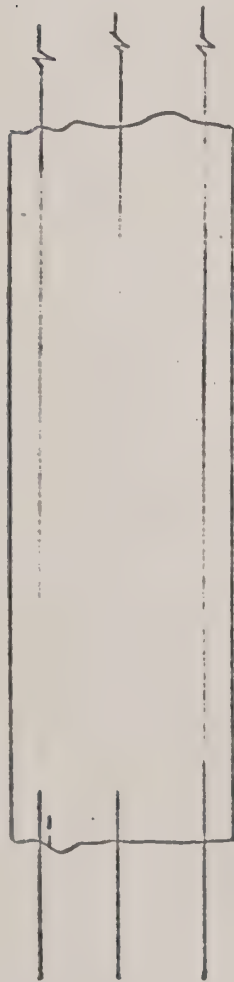
π 62



6 #6
ALL / M6N

9'-7" to ends ?

17" Mark showing
extension of
vertical steel



COULD BE COLUMN

D3, D4, G3, G4 7th → 16th FL.

OR

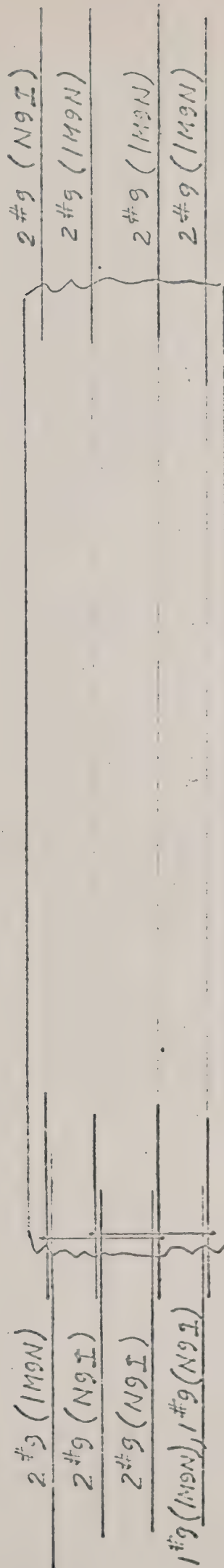
D2, G2 9th → 16th FL.

OR

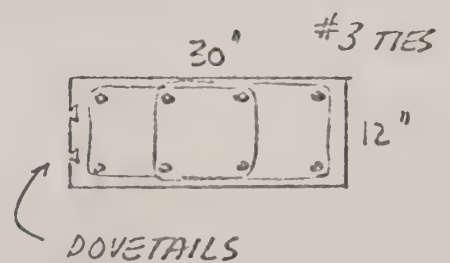
C6, H6, H7 11th → 16th FL.

TT63

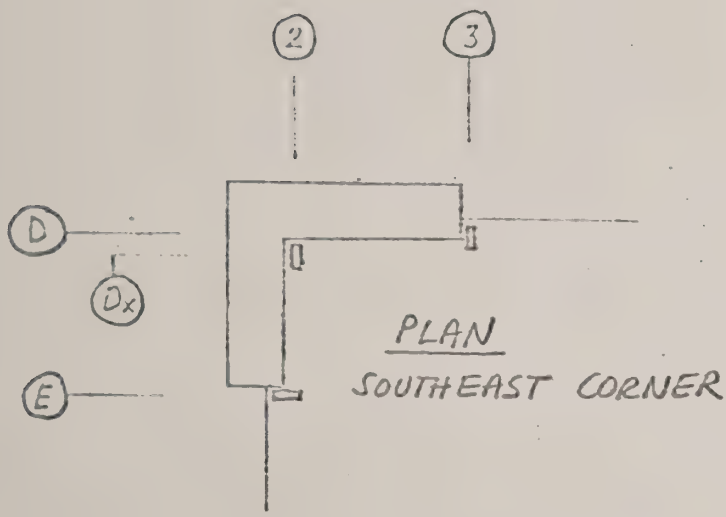
Ground Fl.



IDENTIFIED AS COLUMN
D3, D4, G3, OR G4
FROM GROUND TO
2nd FLOOR (probably
G3 or G4)

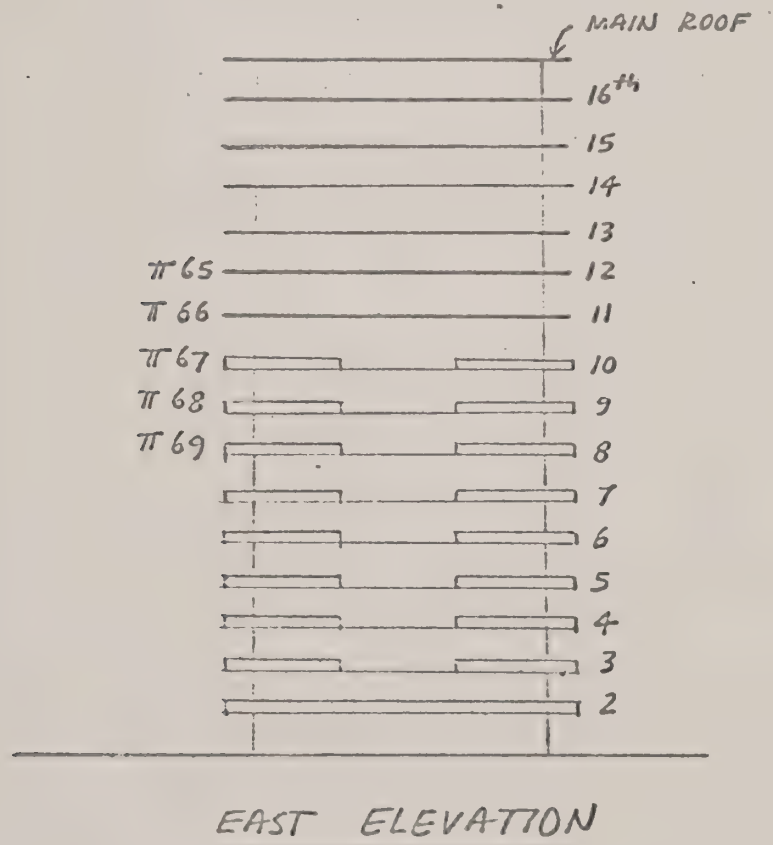


$\pi 65, \pi 66, \pi 67, \pi 68, \pi 69$

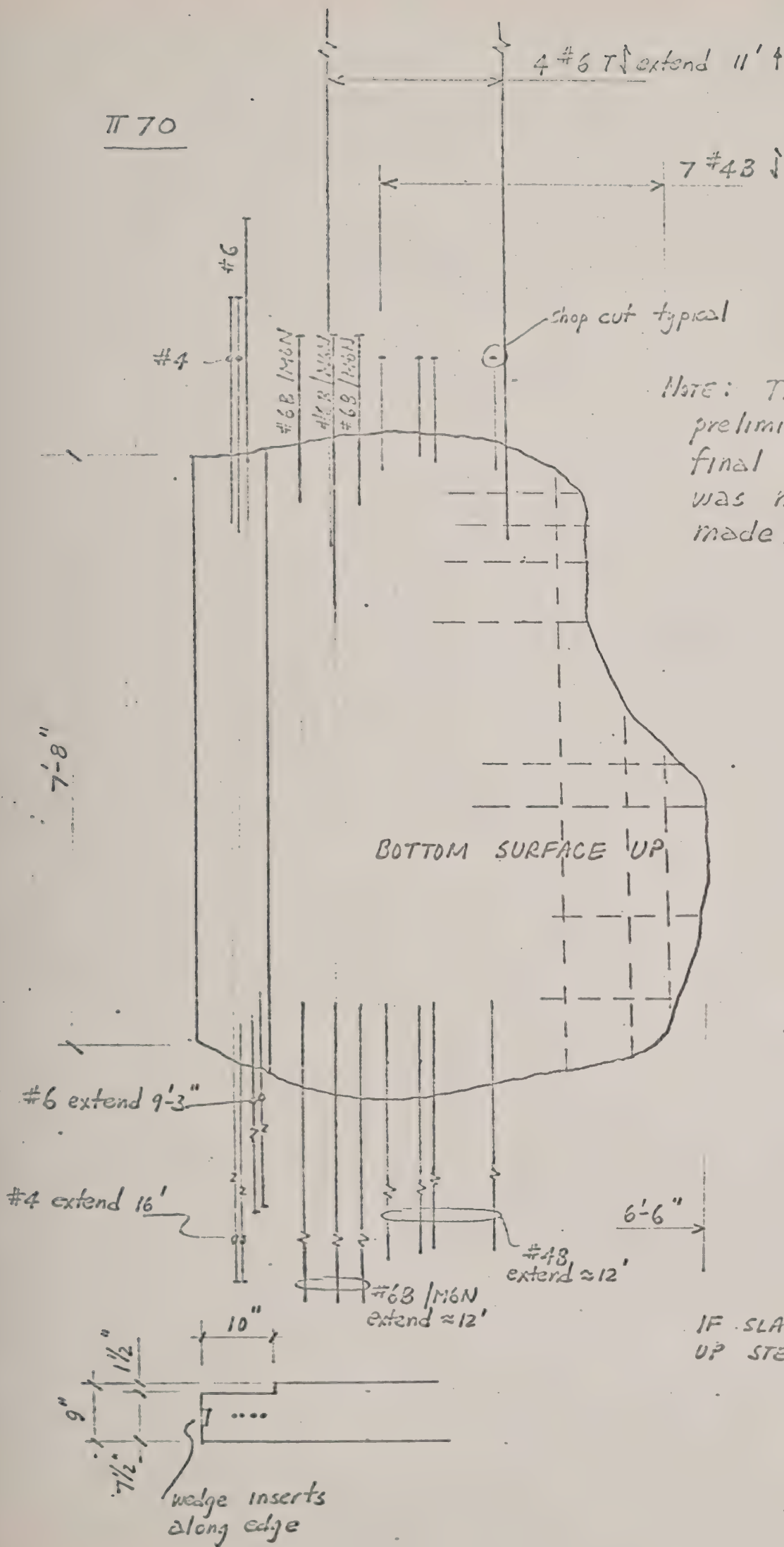


These southeast corner balcony slabs were marked prior to their removal from the collapsed debris.

It is believed that $\pi 67$, $\pi 68$, and $\pi 69$ were removed from the site. Detailed sketches of $\pi 65$ and $\pi 66$ were not made.



Π 70



Note: This sketch is a preliminary one. A final detailed sketch was not made.

8 #4B ↓
I.E. FIRST LAYER LOOKING AT SLAB

IF SLAB WAS TOP SURFACE UP STEEL LAYERS WOULD BE

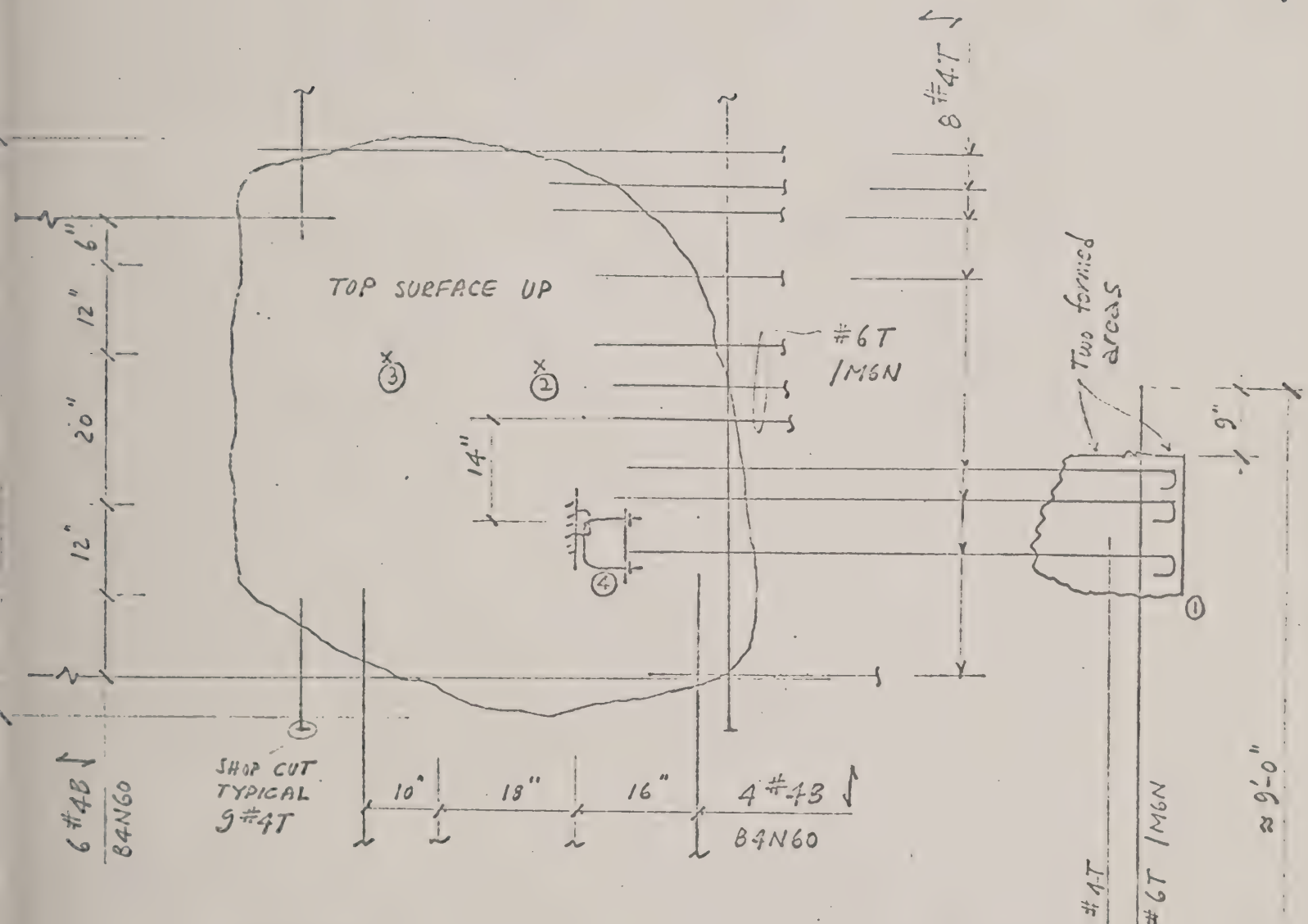
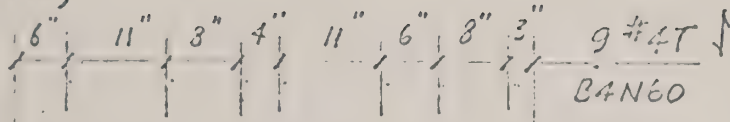
- | | |
|---|-----|
| 1 | ↓ T |
| 2 | → T |
| 3 | ↓ B |
| 4 | → B |

5'-3"

4'-9"

π 71

(ALSO SEE π 71A)



TOP SURFACE UP

STEEL LAYER 1	↓ T	} BUT IN SOME PLACES TOP LAYER → 2nd LAYER ↓
2	← T	
3	↓ B	
4	← B	

- ① 7 1/2" THICK
- ② 8 3/16" THICK
- ③ 8" THICK

- ④ METAL ANCHORAGE TO SUPPORT BEAMS WHICH CARRY MASON'S STAGING.

SEE π 71A

II 71A

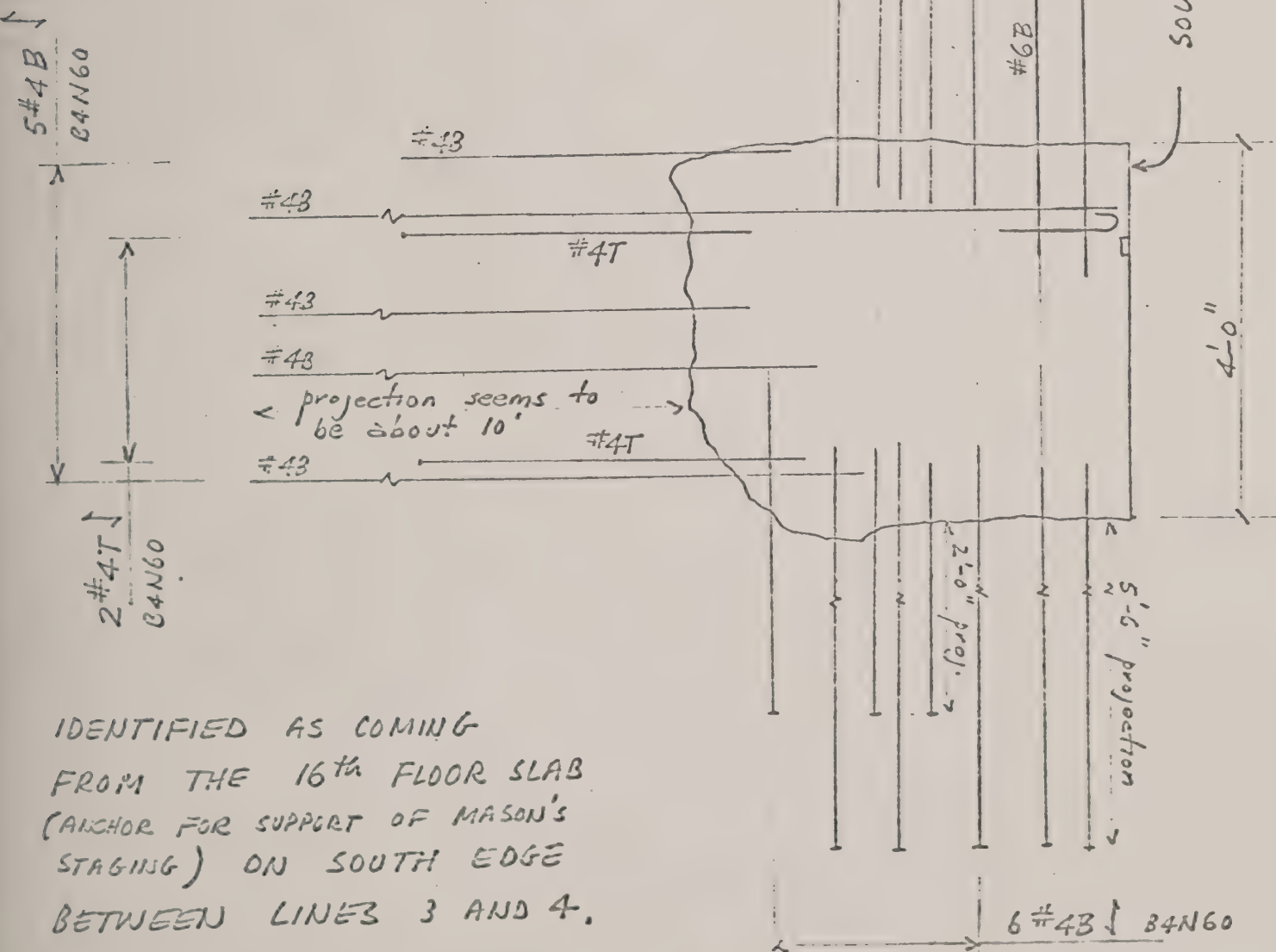
Drawn as though top surface up

Thickness $\approx 7\frac{1}{2}$ "

STEEL LAYER	1	no top steel ↓
	2	← T
	3	↓ B
	4	← B

cannot reach ends of bars

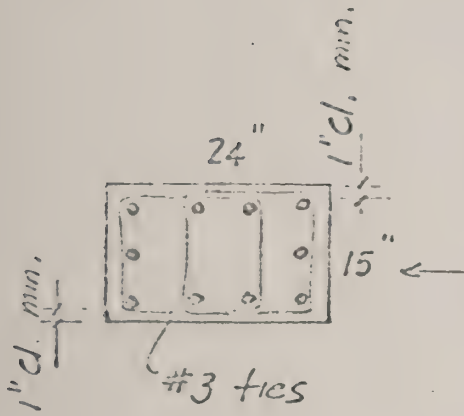
SOUTH EDGE OF SLAB



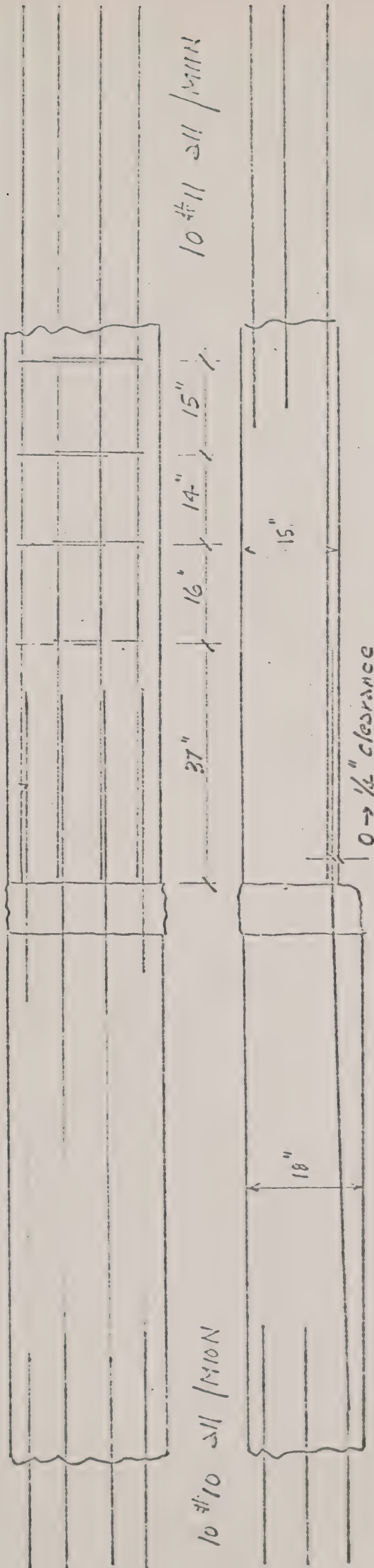
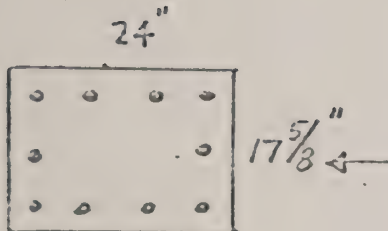
IDENTIFIED AS COMING
FROM THE 16th FLOOR SLAB
(ANCHOR FOR SUPPORT OF MASON'S
STAGING) ON SOUTH EDGE
BETWEEN LINES 3 AND 4.

No trace of ↓ top bars
on either side

T72



No ties within 31" splice, broke edge to first ties.



8th Fl.

7th Fl.

IDENTIFIED AS COLUMN
E4 OR F4

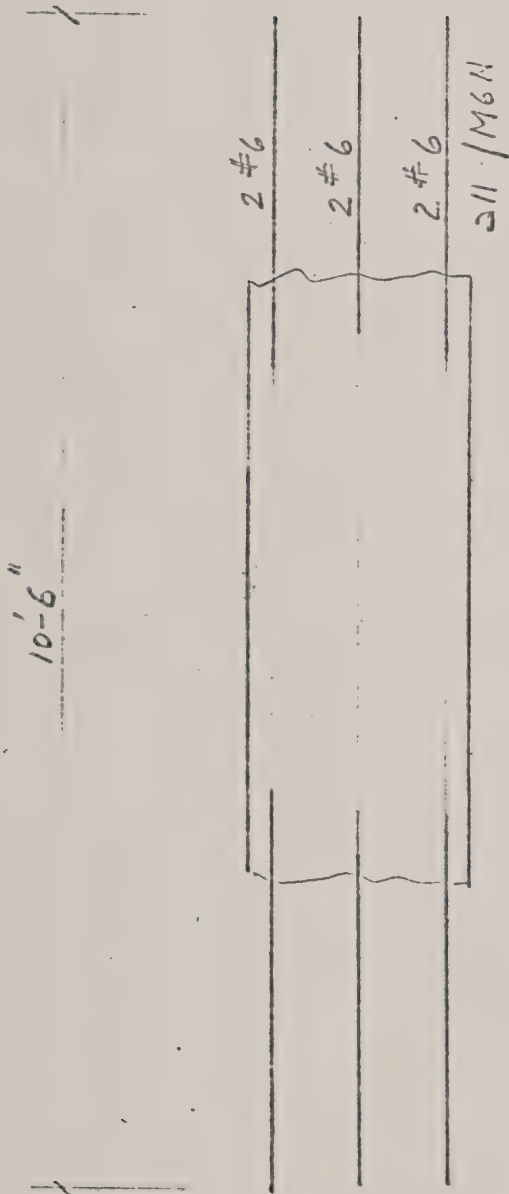
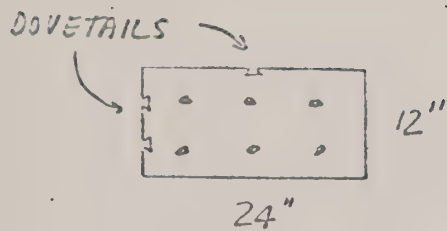
6th Fl.

11'-8"

8"

9'-0"

II 73



COULD BE COLUMN

D3, D4, G3, G4 7th → 16th FL.

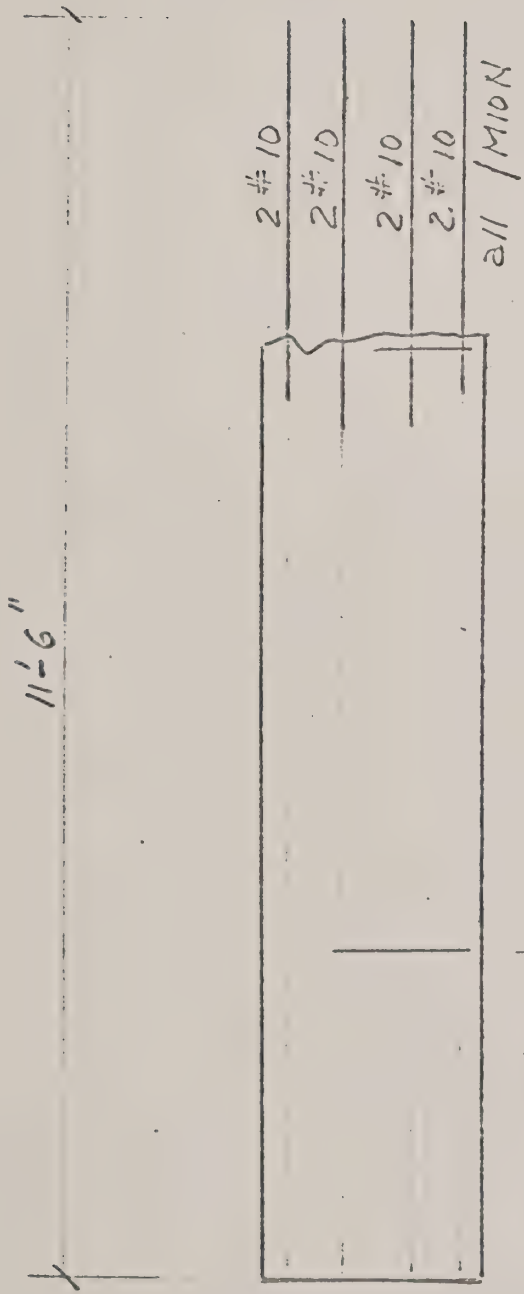
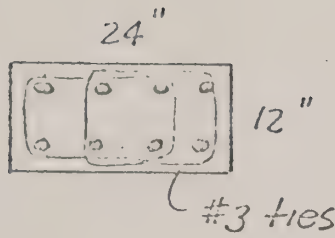
OR

D2, G2 9th → 16th FL.

OR

C6, H6, H7 11th → 16th FL.

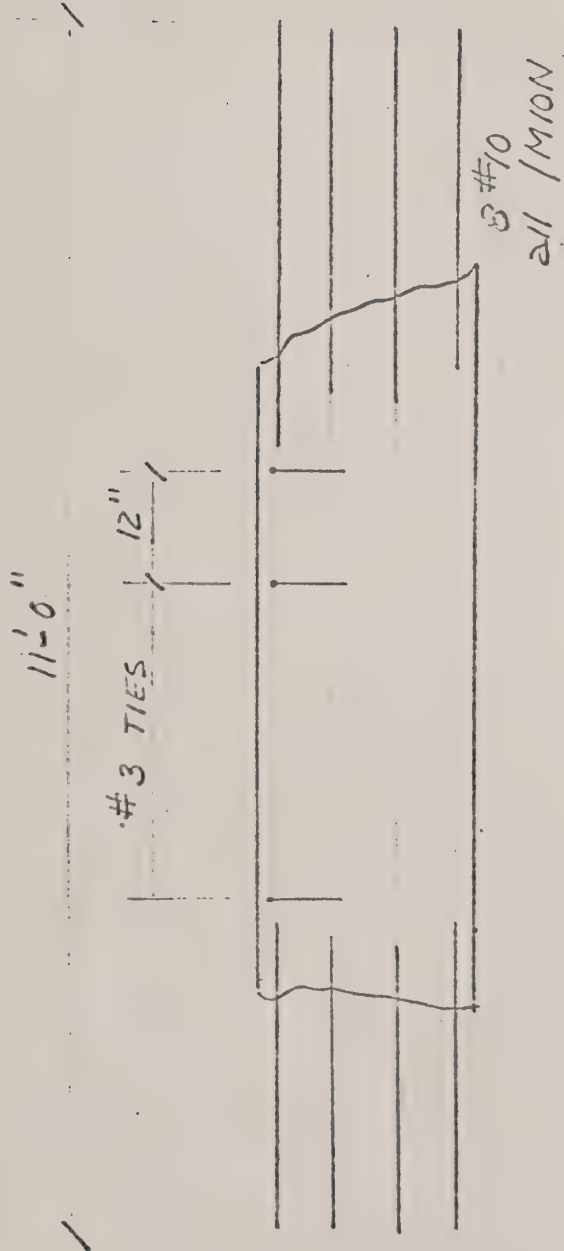
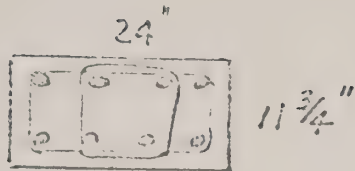
74



IDENTIFIED AS COLUMN
E3, E4, E5, F3, F4, OR F5
FROM 11th TO 12th OR
12th TO 13th FLOORS

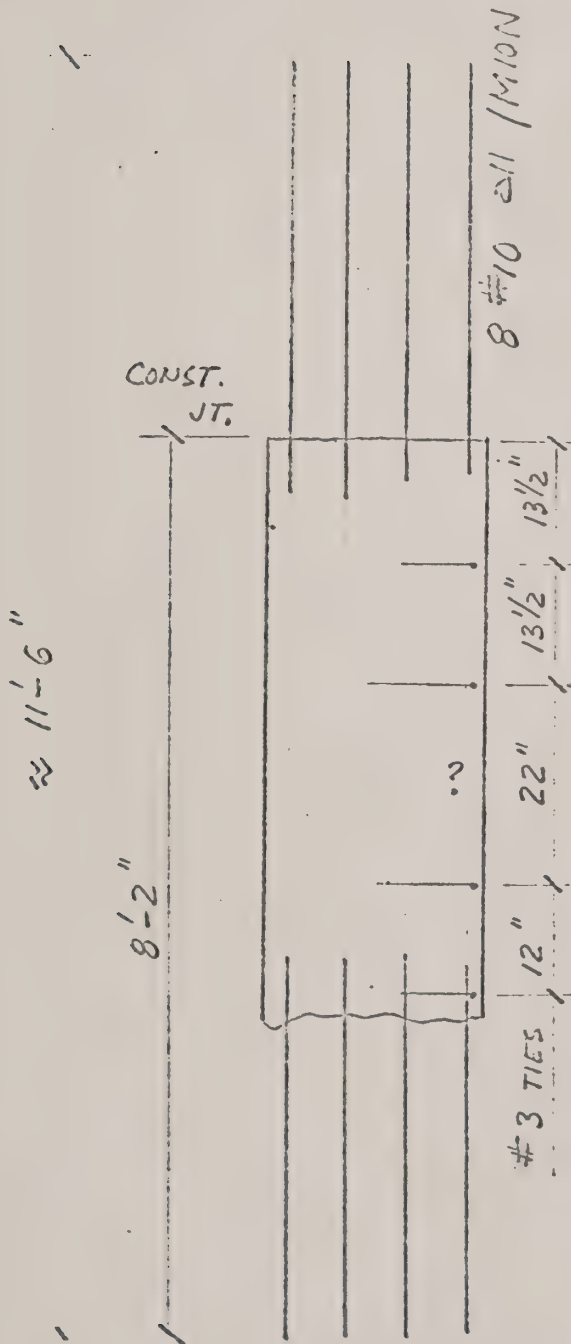
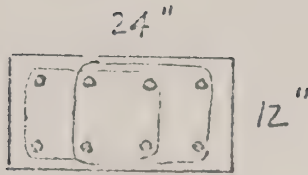
Either 11th or 12th Fl.

Π 75



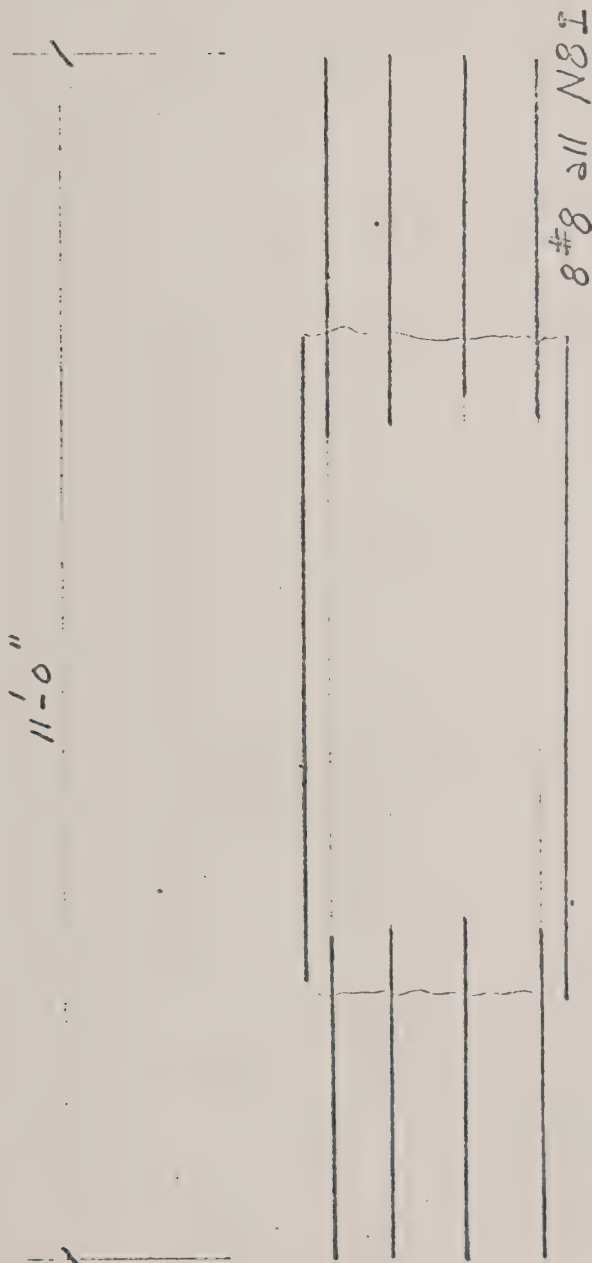
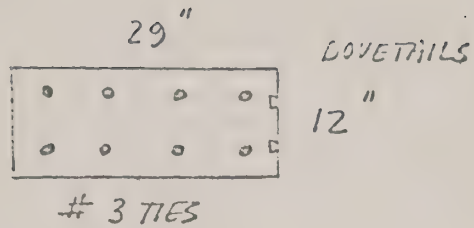
IDENTIFIED AS COLUMN
E3, E4, E5, F3, F4, OR F5
FROM 11th TO 12th OR
12th TO 13th FLOORS

T 76



IDENTIFIED AS COLUMN
E3 OR F3
FROM 11th TO 12th OR
12th TO 13th FLOORS

77



IDENTIFIED AS COLUMN
E2 OR F2 SOMEWHERE
BETWEEN 4th AND
7th FLOORS

TT 78

TOP SURFACE UP

(t) THICKNESS $8\frac{1}{2}"$

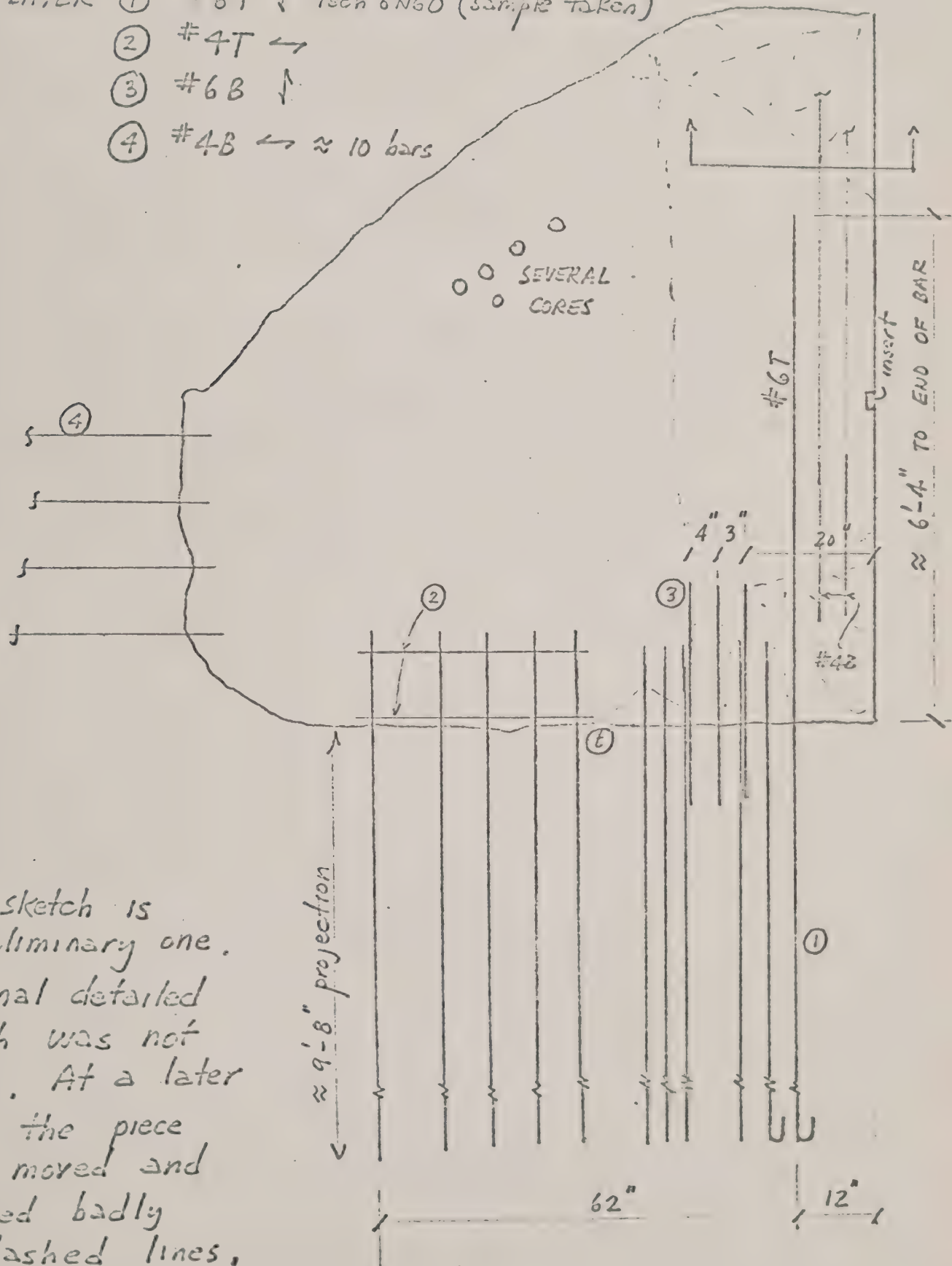
This detail signifies
slab as being from
3rd to 16th floors along
east edge between
lines E & F OR along
south or north edge
between lines 6 & 7

STEEL LAYER ① #6T ↓ Tech 6N60 (sample taken)

② #4T ←

③ #6B ↓

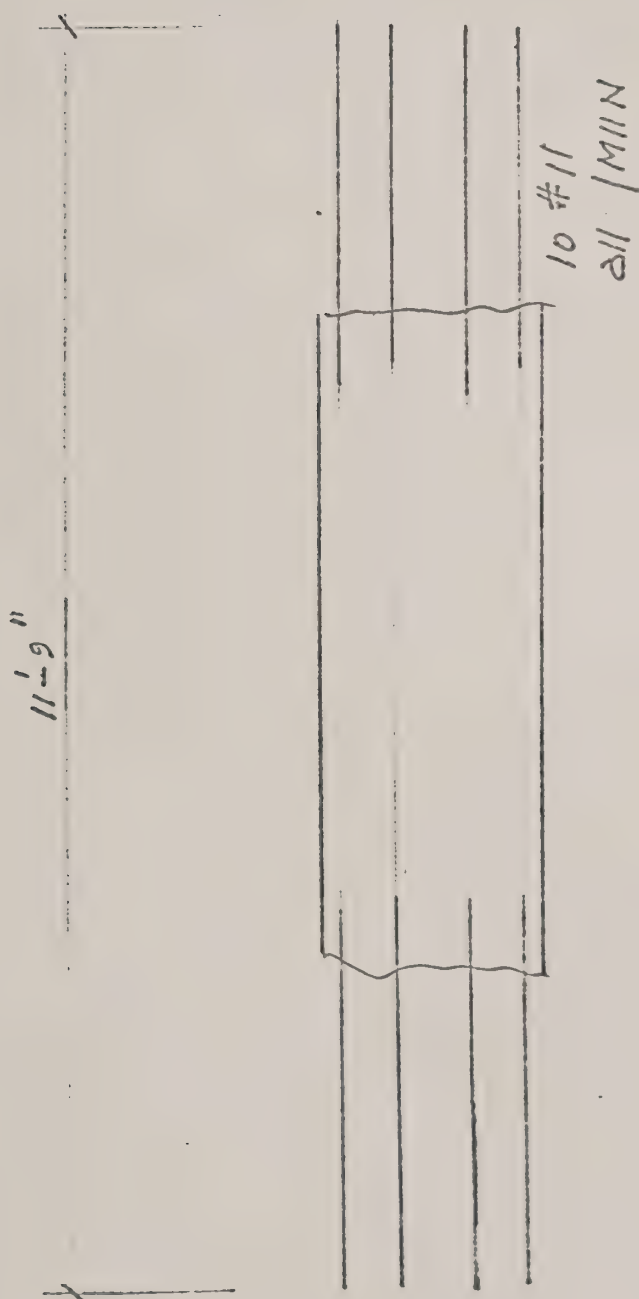
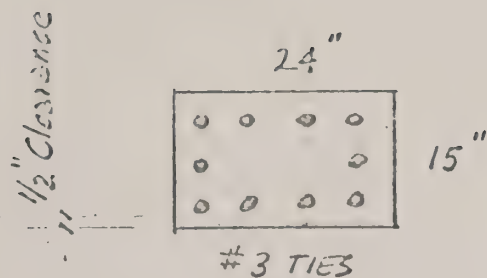
④ #4B ← ≈ 10 bars



Note:

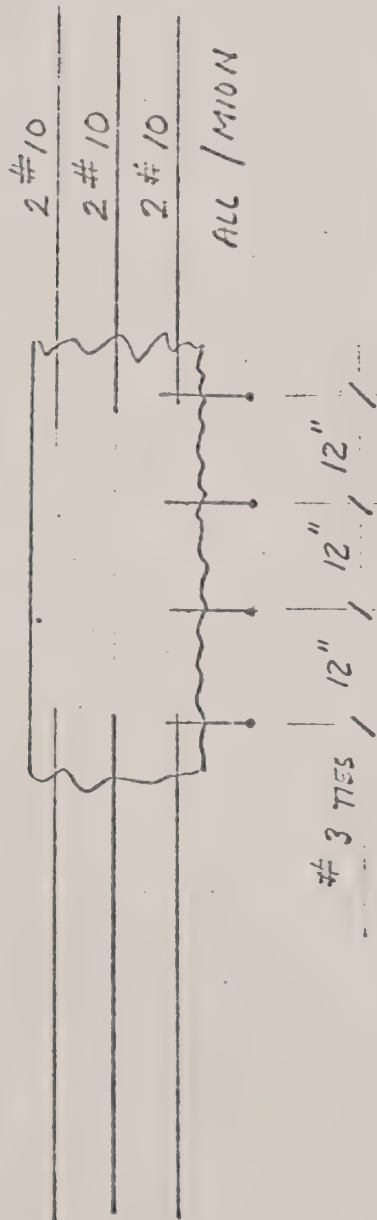
This sketch is
a preliminary one.
A final detailed
sketch was not
made. At a later
date the piece
was moved and
cracked badly
at dashed lines.

π 79



IDENTIFIED AS COLUMN
E4 OR F4 FROM 7th
TO 8th FLOORS OR
E3, E5, F3, OR F5 FROM
8th TO 9th FLOORS.

11'-0"



1131

102"

DOVE-TAILS

12"

SHOP CUT

BURNED

IDENTIFIED AS
COLUMN C5 OR H5
FROM GROUND FLOOR
UP TO CONST. JT.
BELOW 2nd FLOOR;

5'-5"

2#8 @ 16"

2#8 N8I

2#8 N8I

2#8 N8I

2#8 N8I

2#8

2#8 N8I

#4 ties

Const. joint

57" splice for #11's

11'-0"

Grd. Fl.

PLANS CALL FOR
5#8 BENT DOWELS
FROM GRD. FLOOR SLAB.
THEY ARE NOT PRESENT

#4 ties

10" 10" 7" 12" 10" 22"

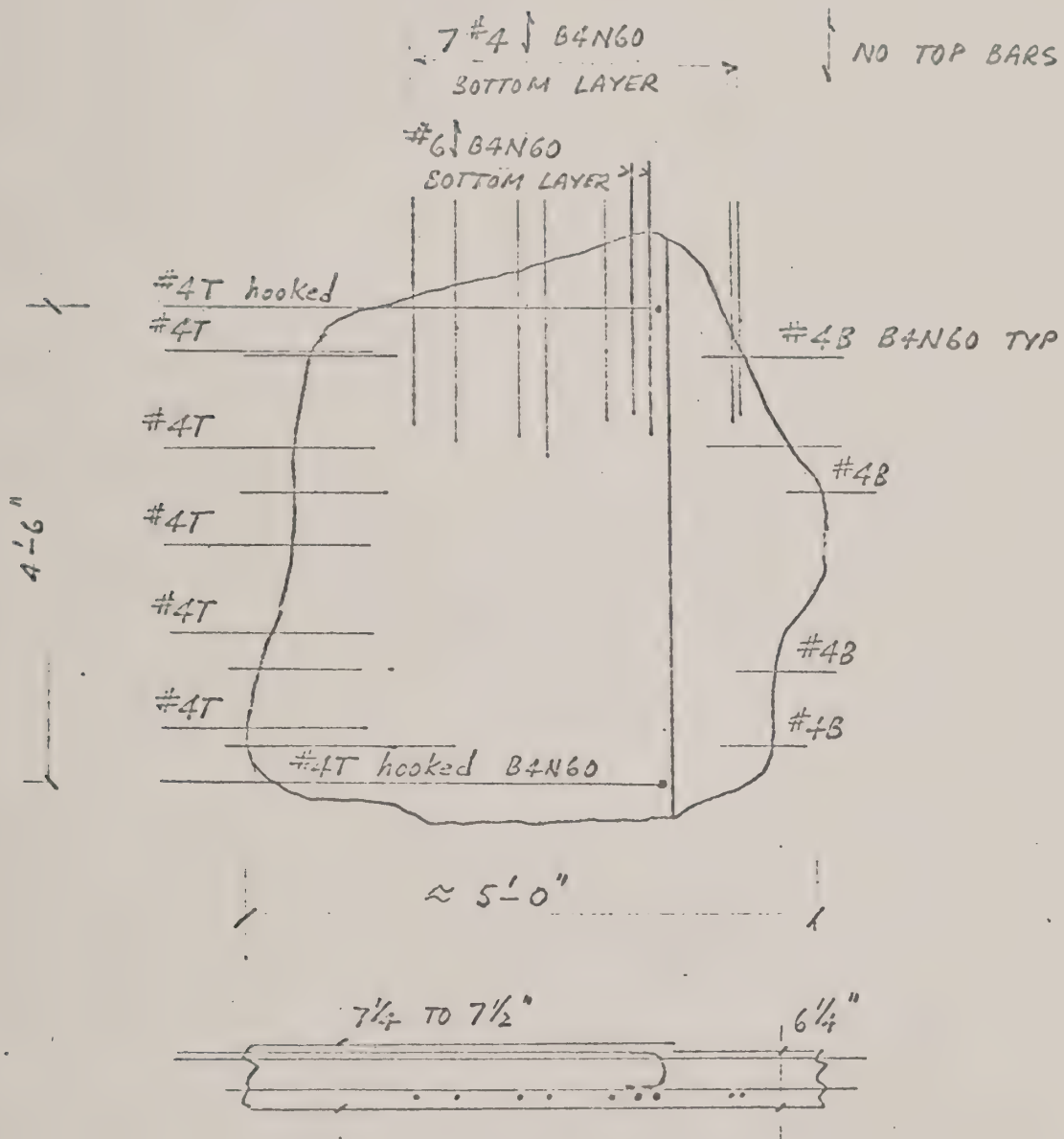
102"

12"

ALL / MIN

11 S2

BOTH TOP AND BOTTOM SURFACES
OF CONCRETE ARE SMOOTH



PRELIMINARY SKETCH

FINAL SKETCH NOT MADE

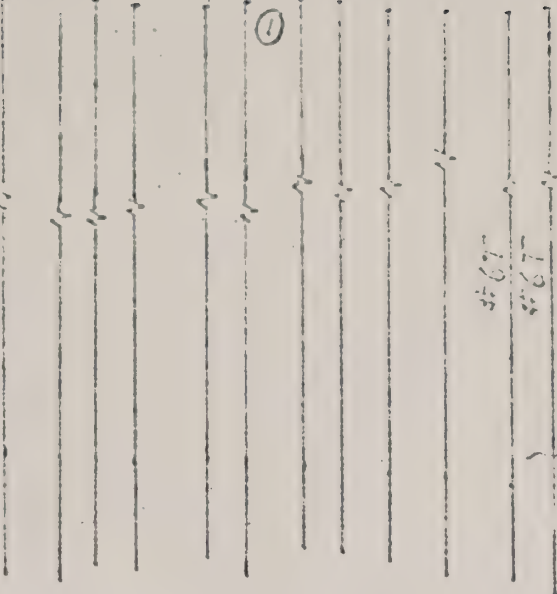
APPEARS TO BE FROM TYPICAL
FLOORS, PART BALCONY AND PART
INTERIOR SLAB

π 83

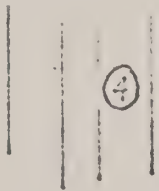
Preliminary sketch.

No final sketch made. Because of typical edge detail slab comes from 3rd to 16th floors (see π 73 for position)

≈ 10' projection for #6T bars



(2) AND (3)



BLOB OF GREEN CONC. FROM MECHANICAL FLOOR SLAB. ELECTRICAL WIRE EMBEDDED.

CRACKED #6 BARS } DO NOT COME TO CRACK

4" Clearance

8'-0"

≈ 5'-6"

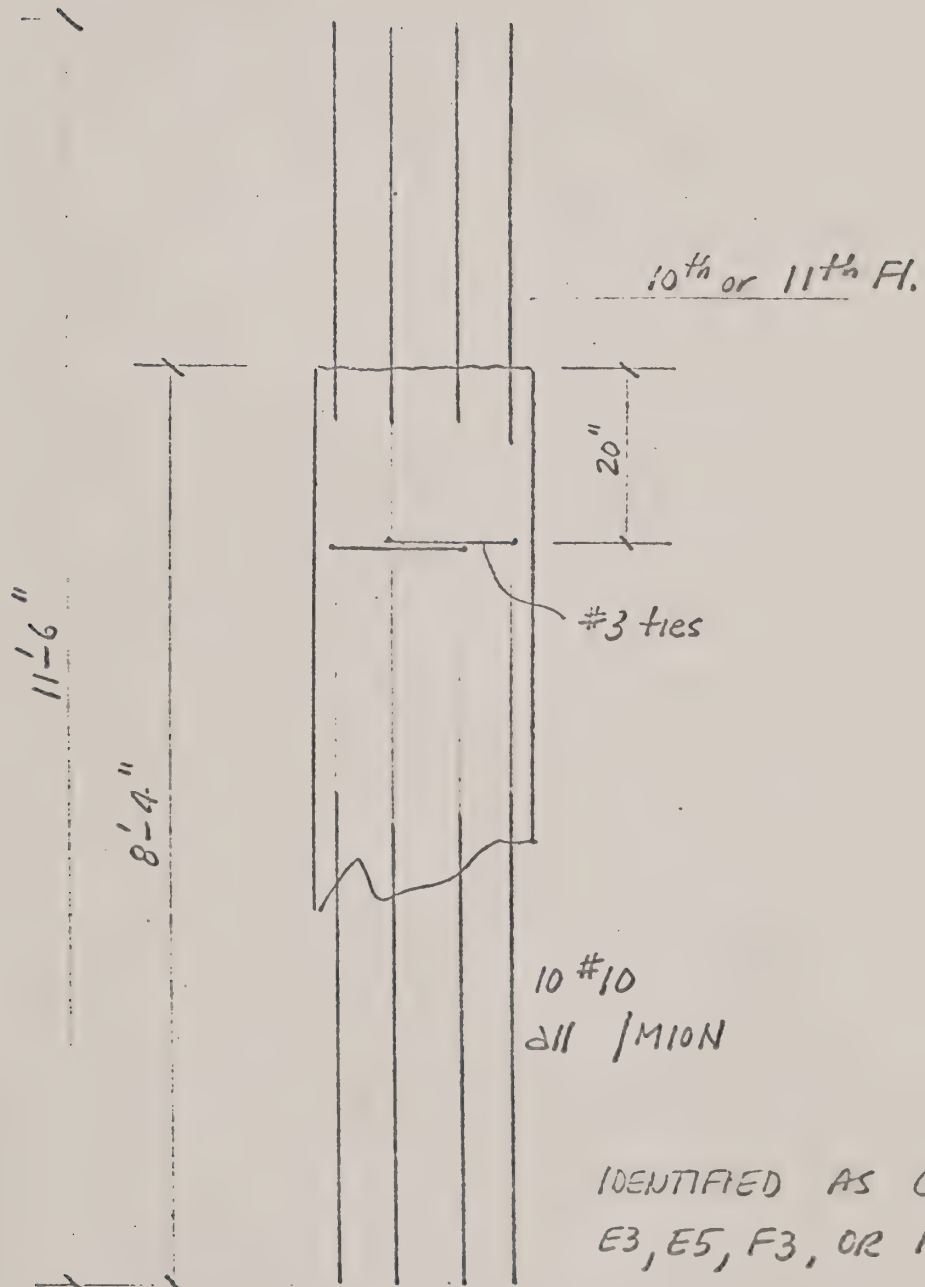
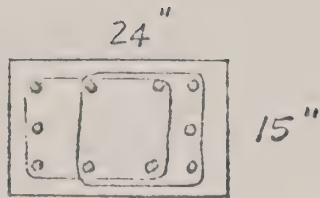
TOP SURFACE UP

STEEL LAYER

- ① #6T (3 1/4" Clearance)
- ② #4T ≈ @ 12" c/c
- ③ #4B ≈ @ 12" c/c
- ④ #4B ≈ @ 6" c/c

ALL BARS B O N 60

Π34

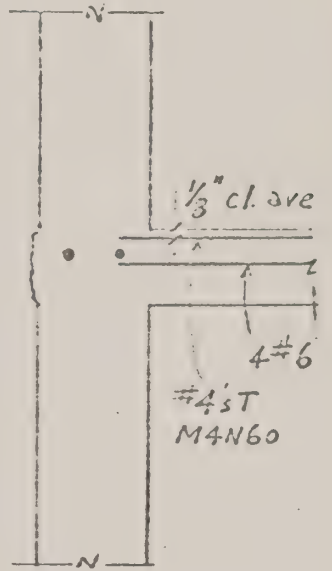
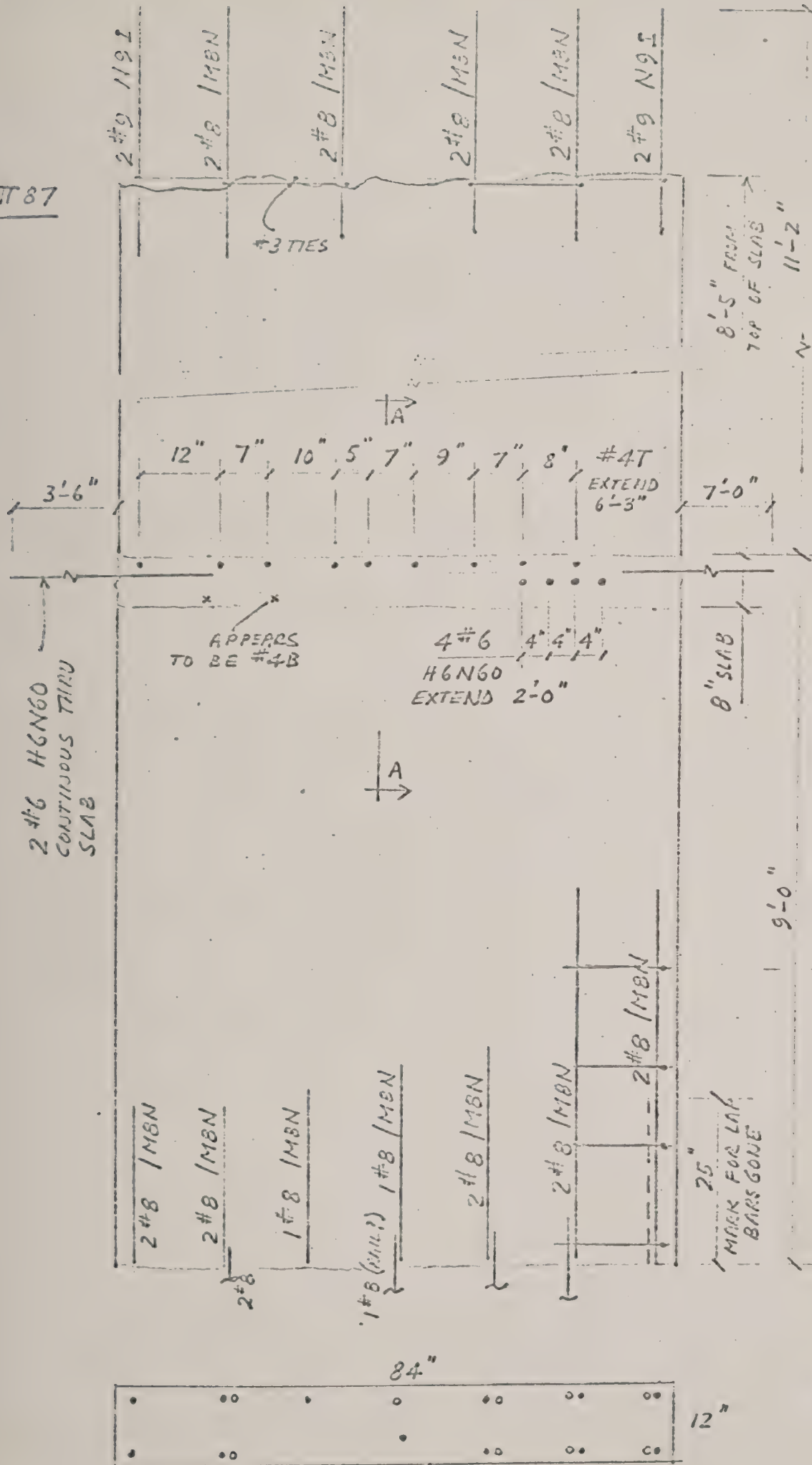


IDENTIFIED AS COLUMN
E3, E5, F3, OR F5 FROM
9th TO 10th OR 10th TO
11th FLOORS

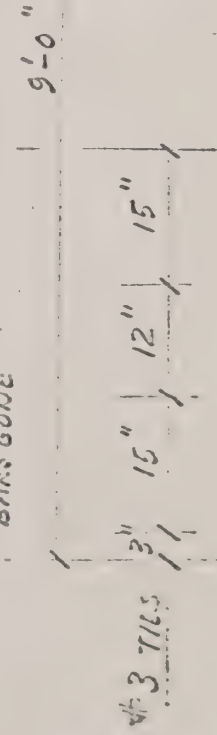
T 85

≈ 1/2 CUBIC YARD BLOB OF GREEN
CONCRETE WITH A FEW #6
BARS AND OTHER ASSORTED
THINGS.

IT 87

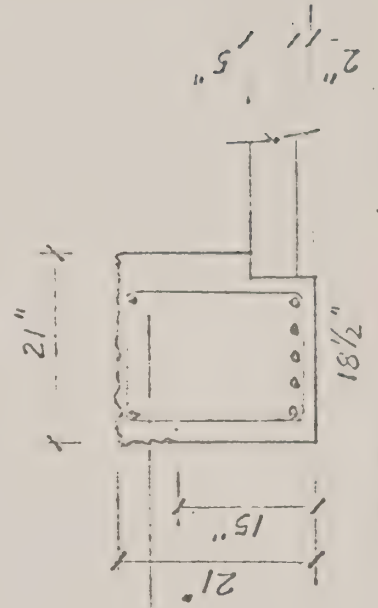
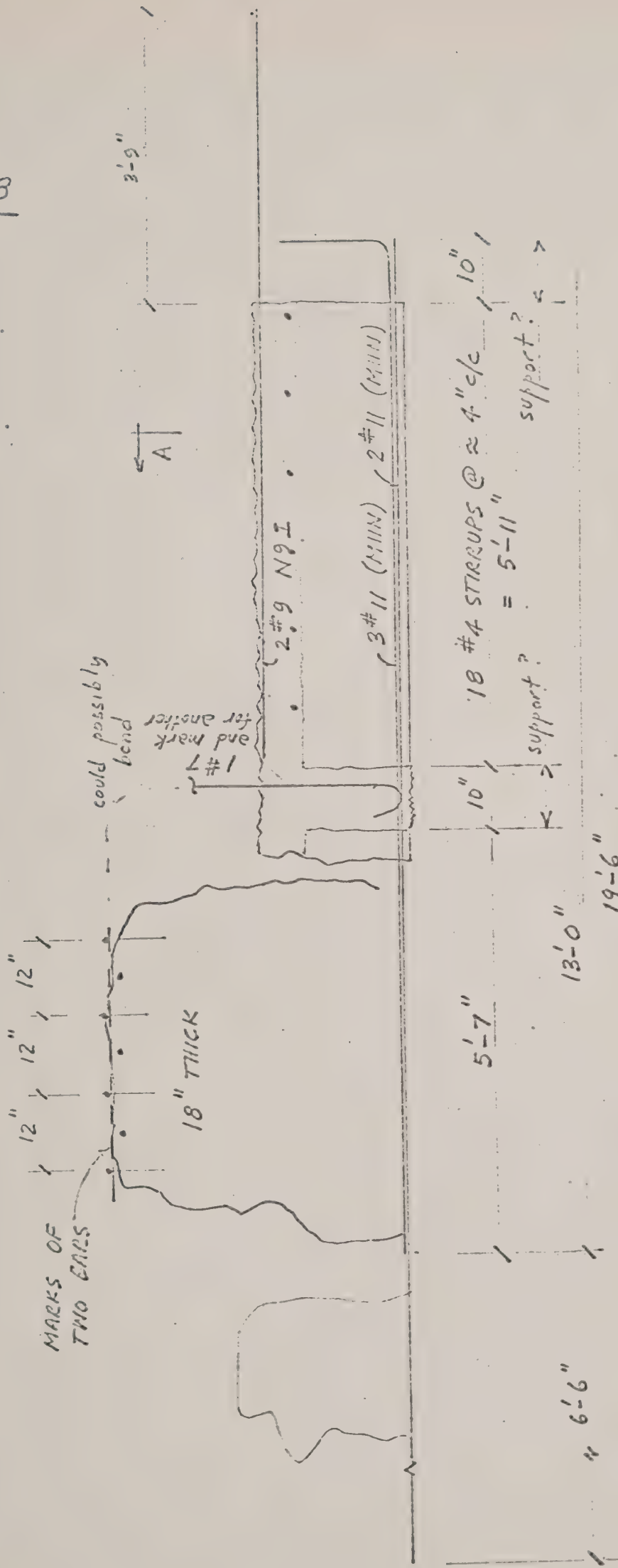


SECTION A-A



APPEARS TO BE BEAM 18" x 46"
with #7 stirrups @ 12"
and #4 @ 12" horizontal coming out

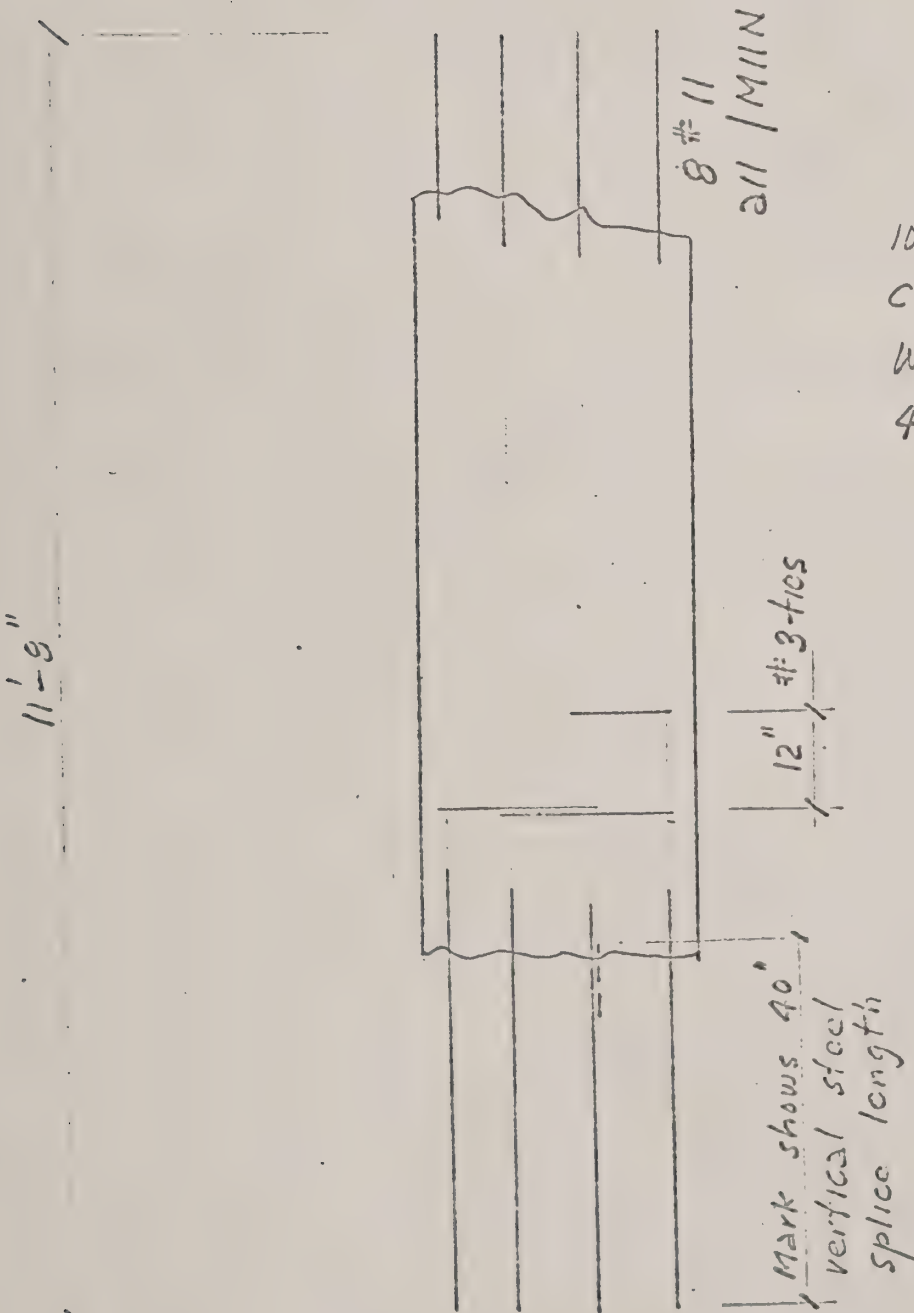
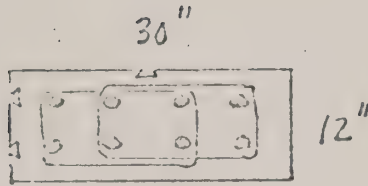
8811



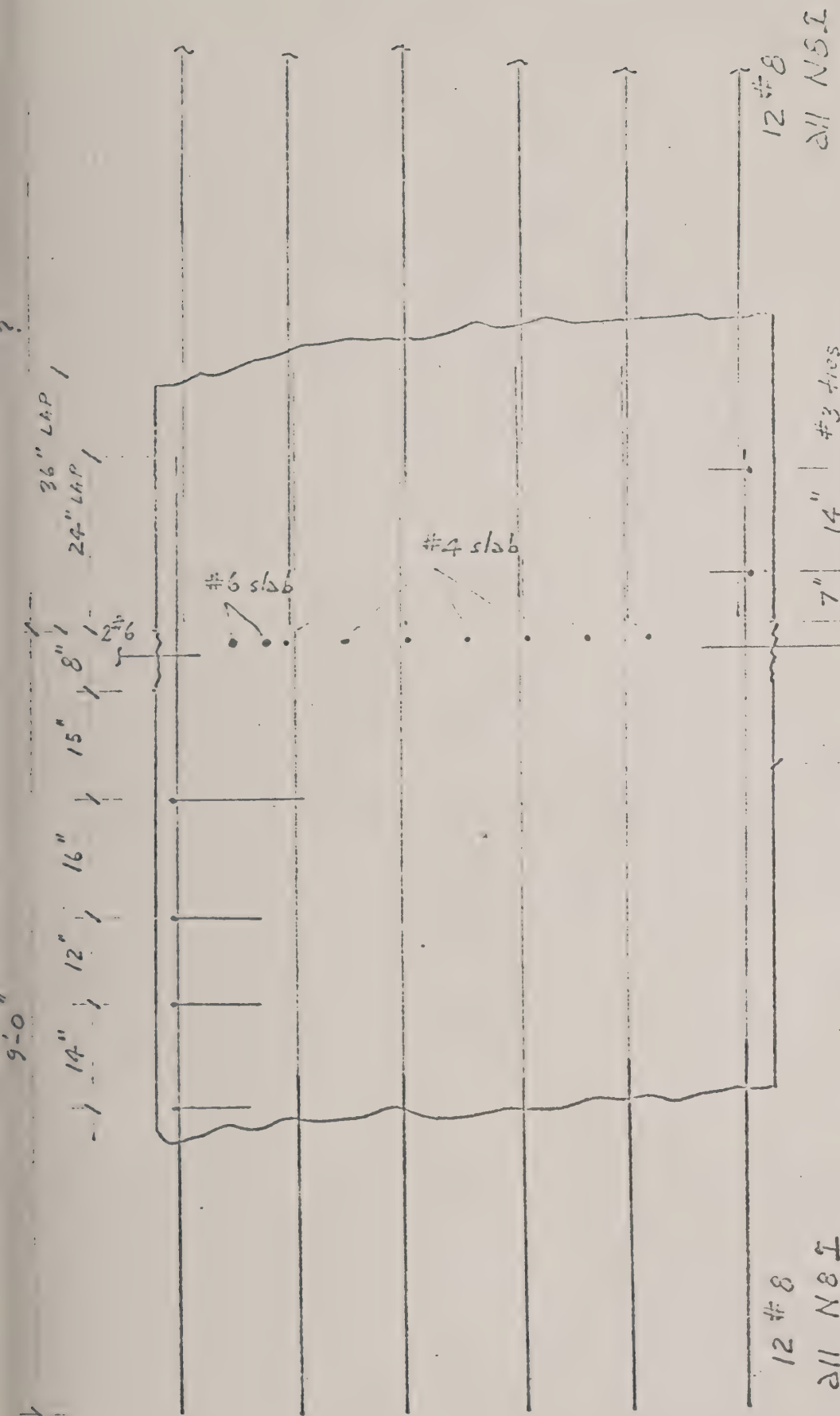
#6 @ 12" within slab area
one bar $\approx 22'$ long

SECTION A

1139



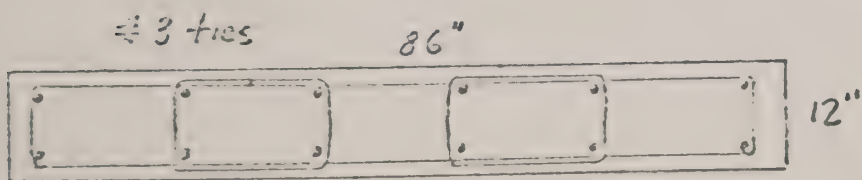
IDENTIFIED AS COLUMN
C6, H6, OR H7 SOME-
WHERE BETWEEN
4th AND 7th FLOORS



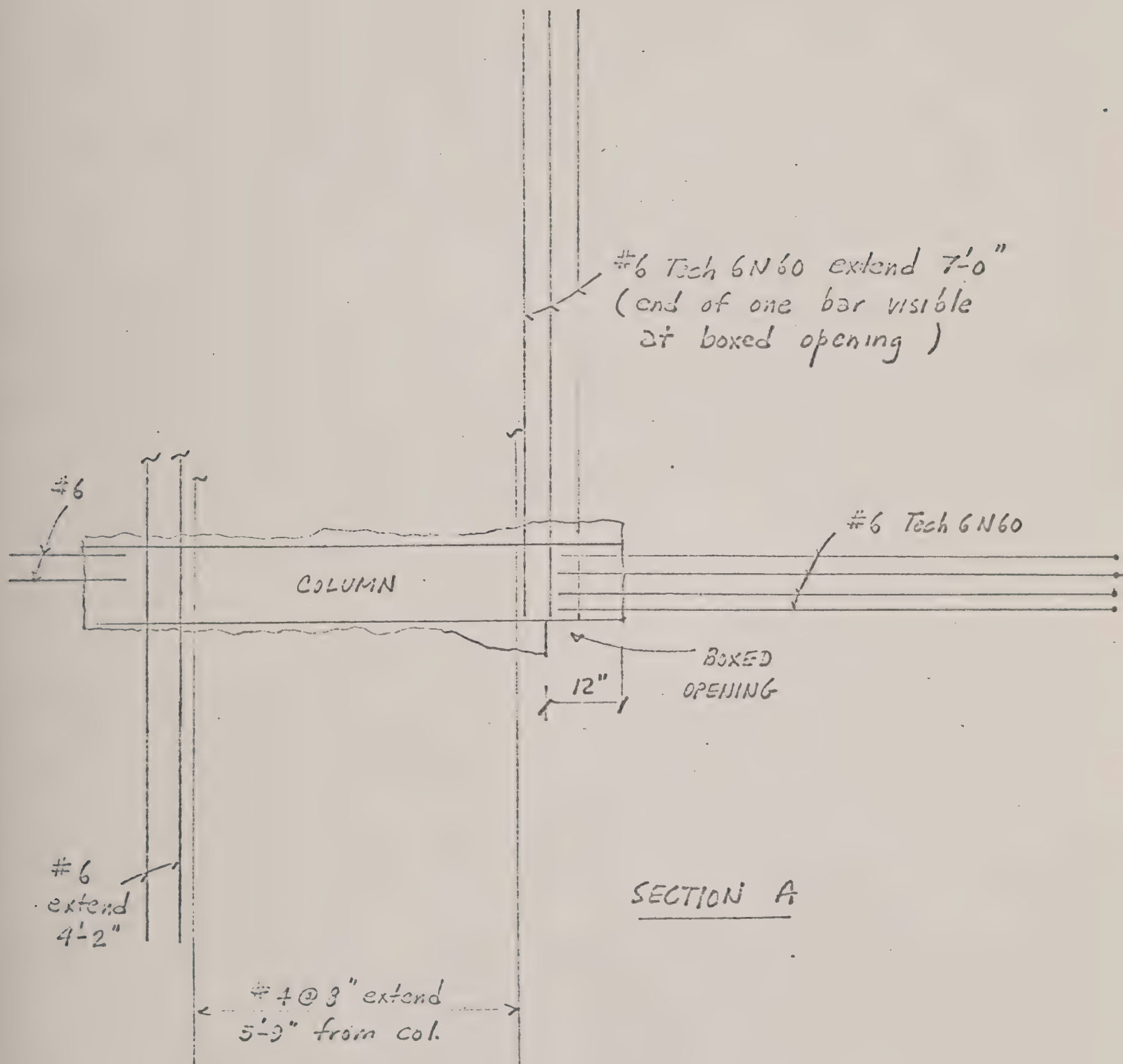
SEE FOLLOWING
PAGE FOR SECTION A

A ↓
4 #6 Tech 6N60
within limits of col.
6'-4"

IDENTIFIED AS COLUMN
C5 OR 45. THE
FLOOR SLAB COULD BE
THE 3rd, 4th, 5th, OR 6th.

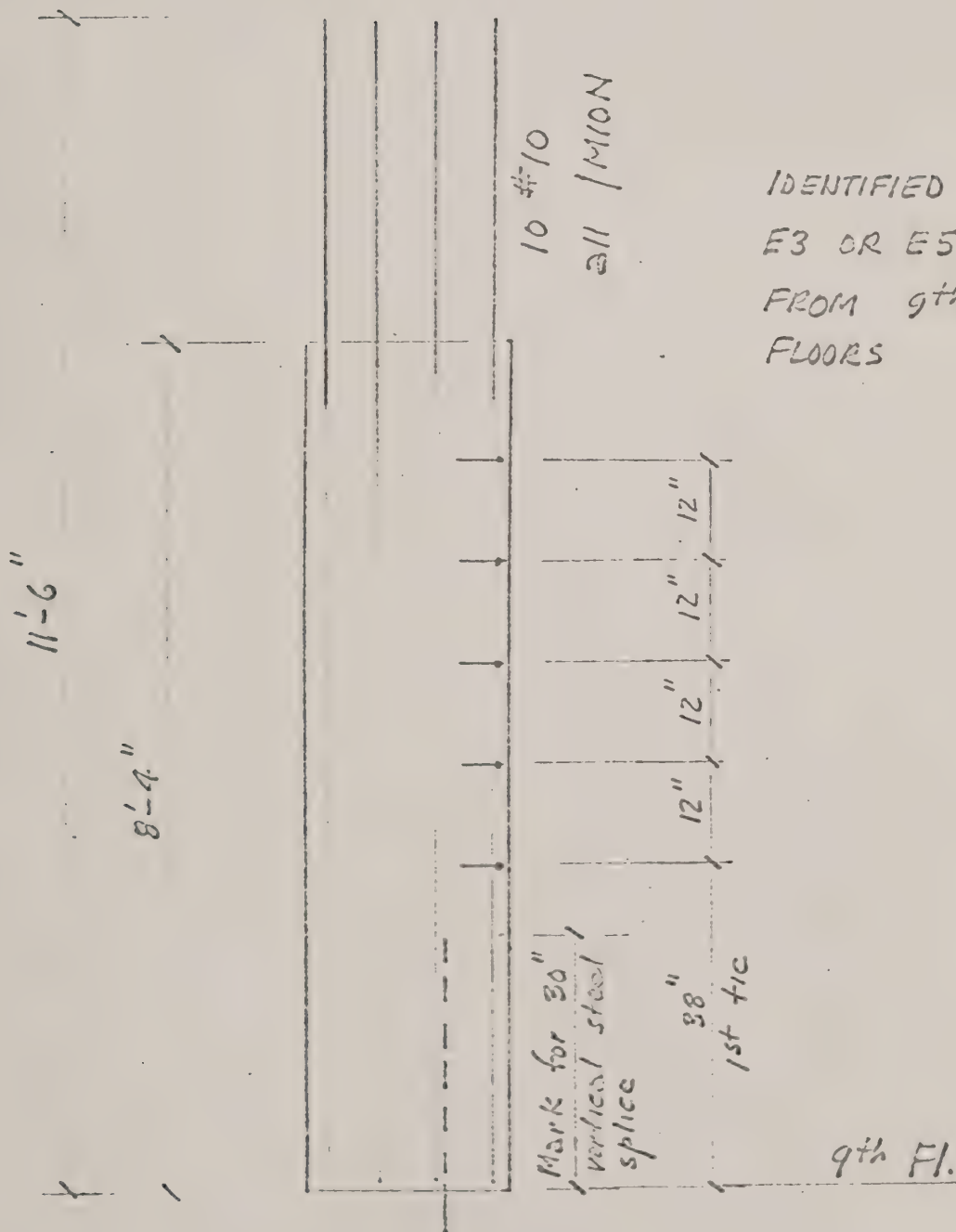
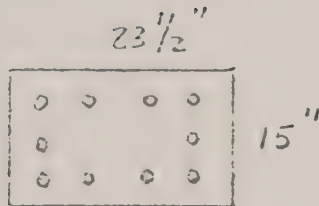


TI 90 CONTINUED



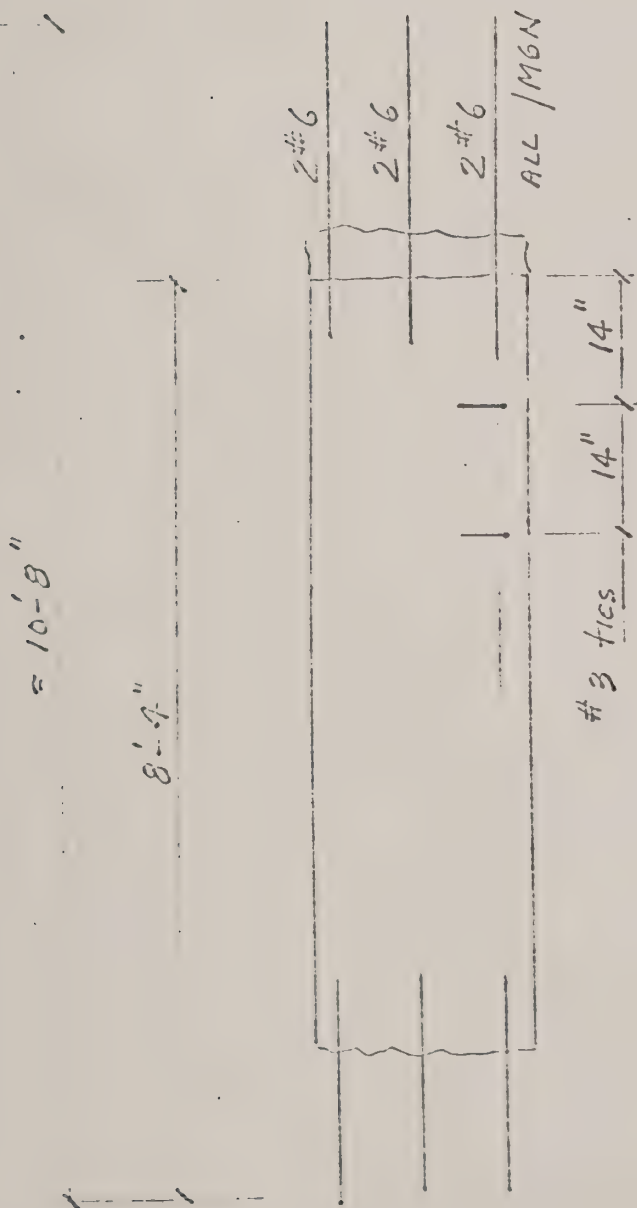
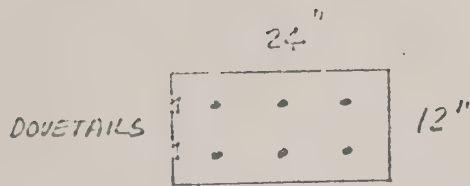
91

THIS PIECE TAKEN OUT
OF THE HOLE ON
SATURDAY, FEB 13, 1970,
ADJACENT TO ELEVATOR
ON SOUTH SIDE



IDENTIFIED AS COLUMN
E3 OR E5
FROM 9th TO 10th
FLOORS

WF1



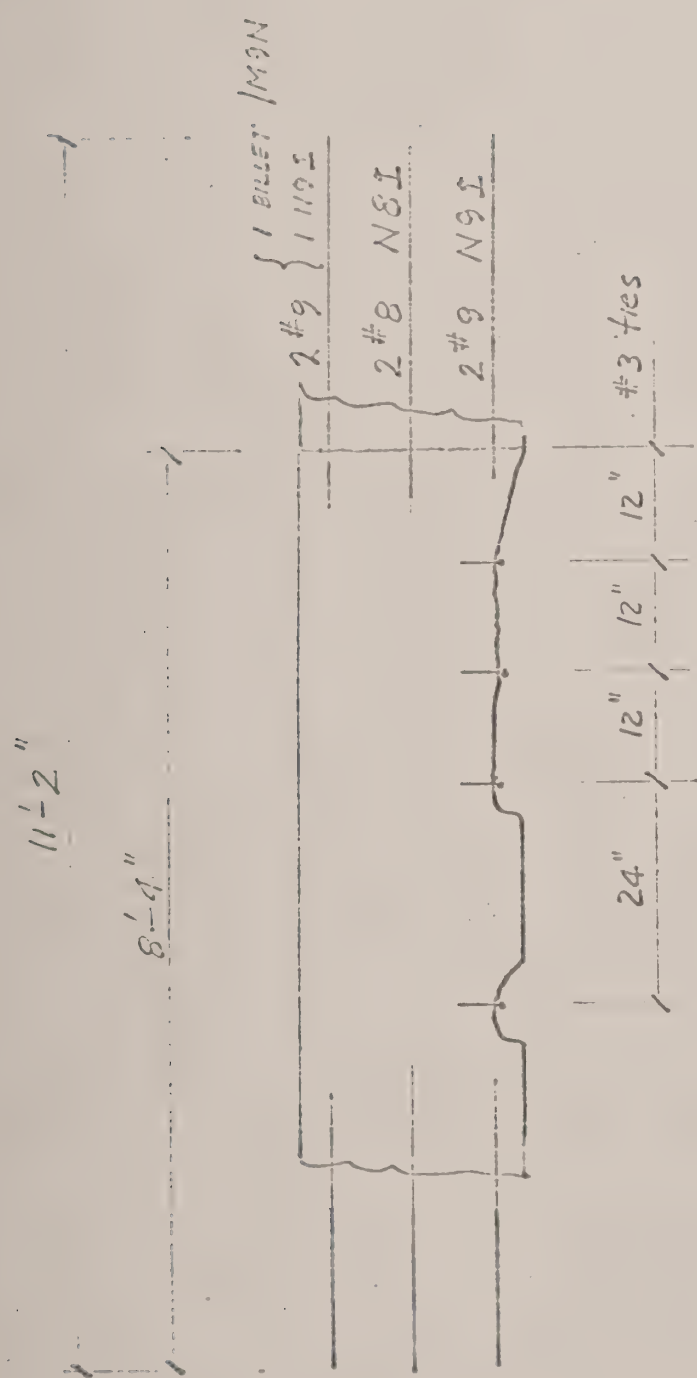
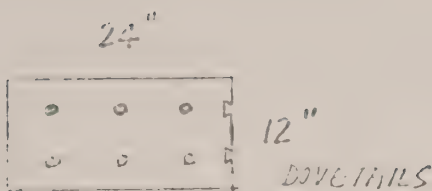
IDENTIFIED AS COLUMN

D3, D4, G3, G4 7th TO 16th FLOORS
OR

D2, G2 9th TO 16th FLOORS
OR

C6, H6, H7 11th TO 16th FLOORS

W7C



THE FOLLOWING EXTERIOR COLUMNS HAD 6#8

D3, D4, G3, G4 3rd TO 4th FL.
C6, H6, H7 10th TO 11th FL.

THE FOLLOWING EXTERIOR COLUMNS HAD 6#9

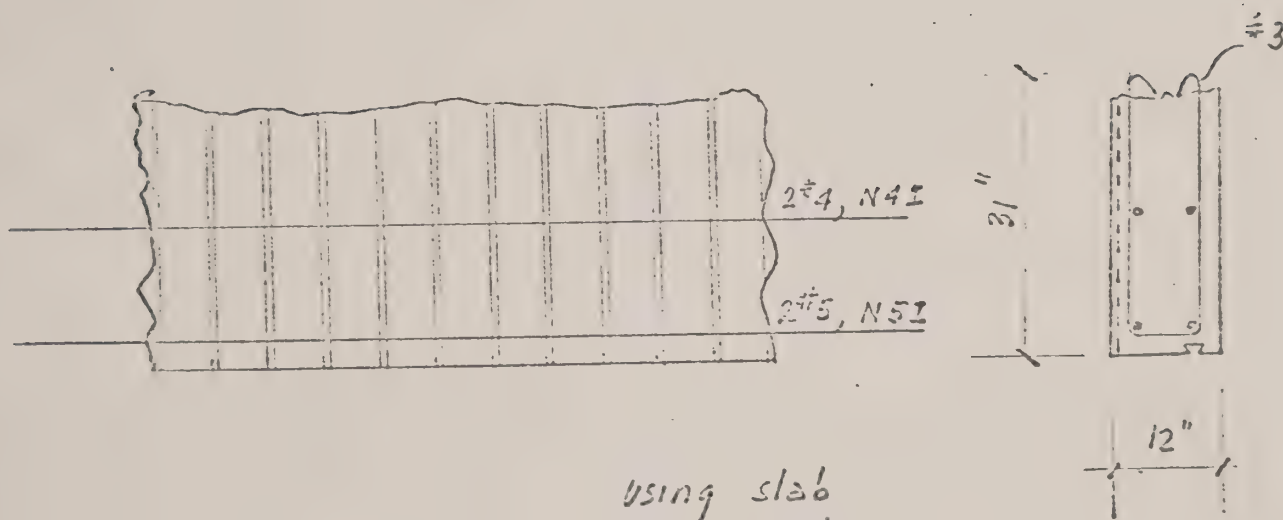
D3, D4, G3, G4 2nd TO 3rd FL.
D2, G2 5th TO 8th FL.

THIS PIECE COULD BE ANY ONE OF THE ABOVE SPECIFIED COLUMNS, BUT NO SPECIFIED COLUMN HAD 2#8 AND 4#9

THIS PIECE WAS FIRST MARKED T41

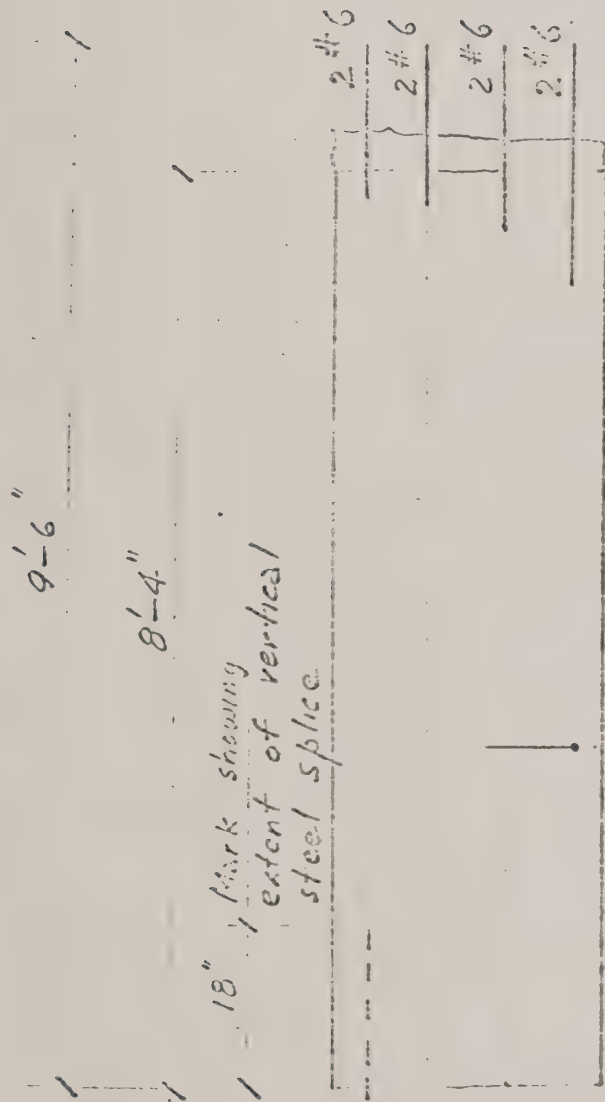
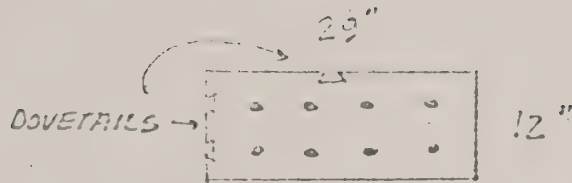
WF 3

IDENTIFIED AS PARAPET
FROM 2nd FLOOR



using slab
bolsters under
stirrups

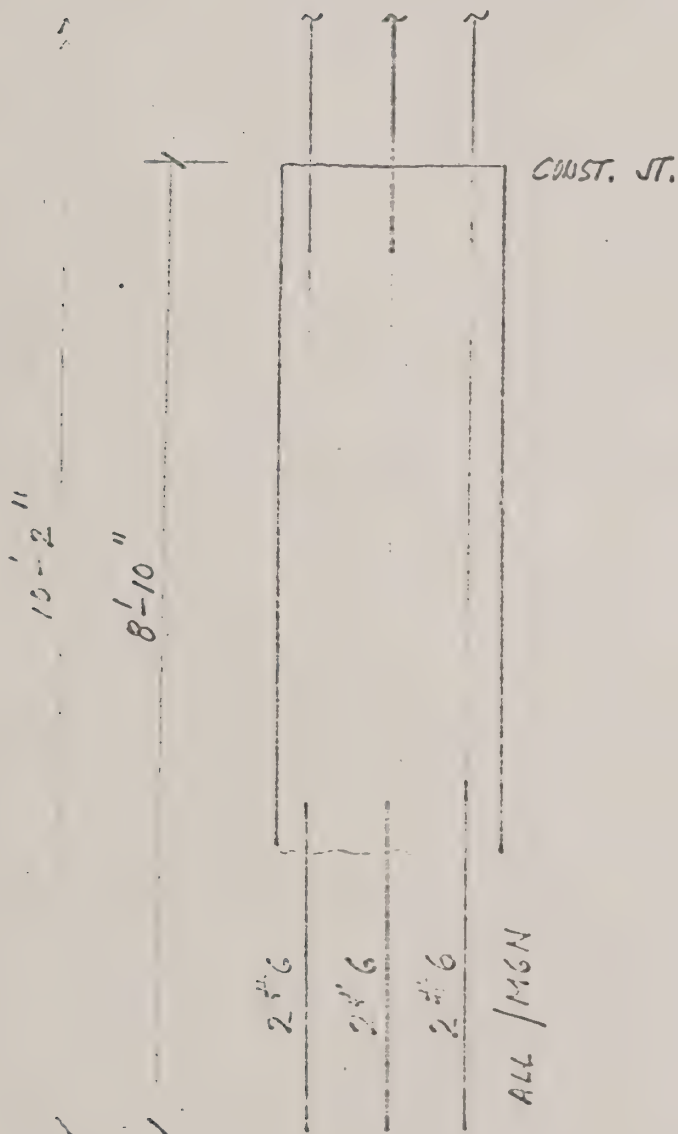
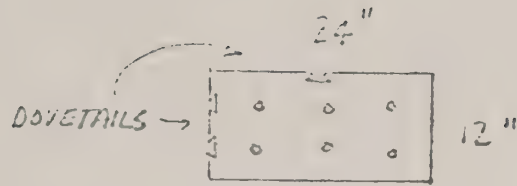
WF-4



37" to 1st
#3 +10

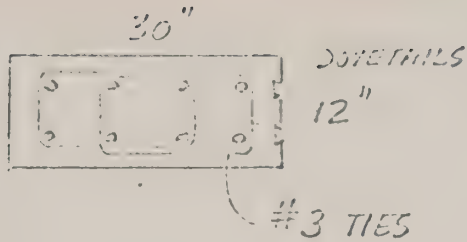
IDENTIFIED AS COLUMN
E2 OR F2 SOMEWHERE
BETWEEN 8th AND
16th FLOORS

WF 5



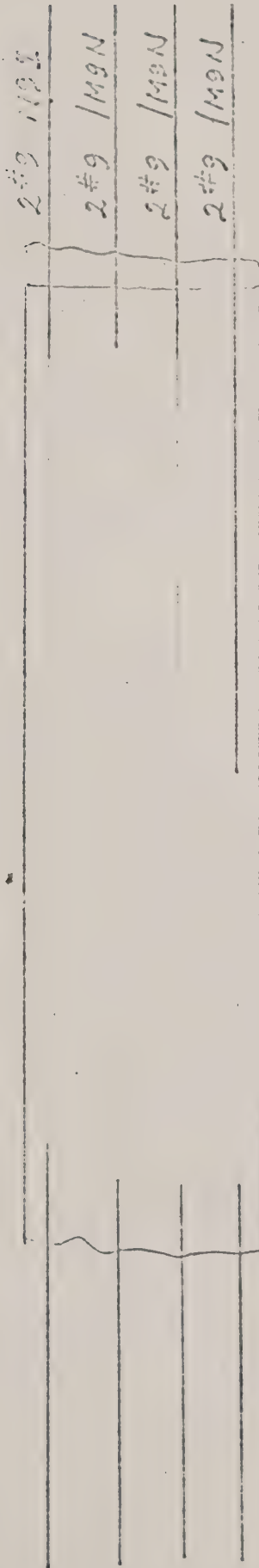
IDENTIFIED AS COLUMN
D3, D4, G3, G4, D2, G2,
C6, H6, OR H7. FROM
16th FLOOR TO ROOF

WF 6



16'-6"

13'-6"

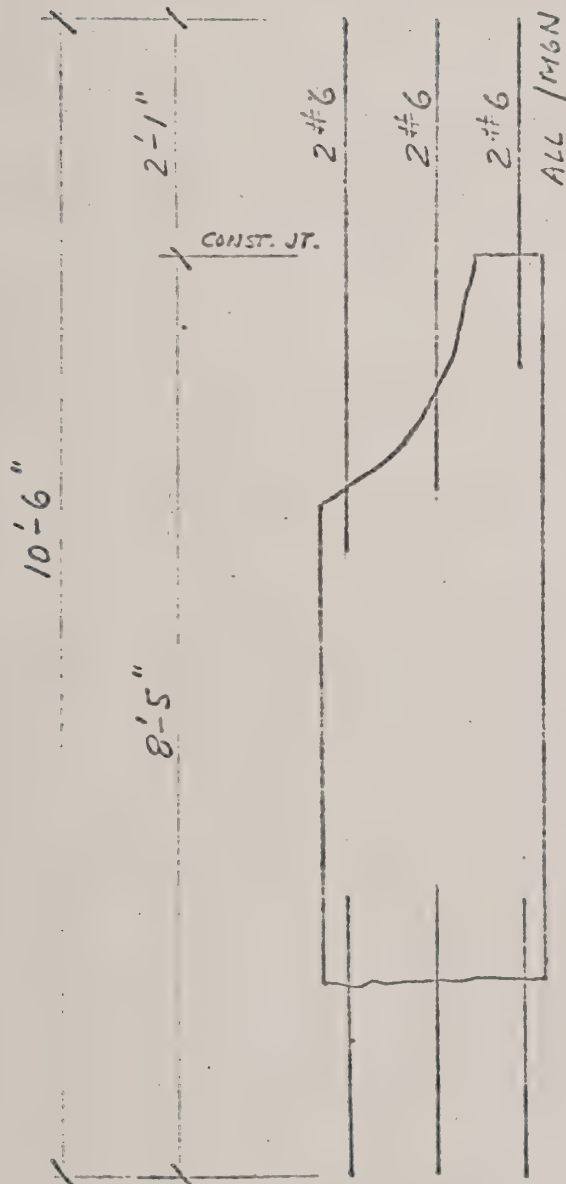
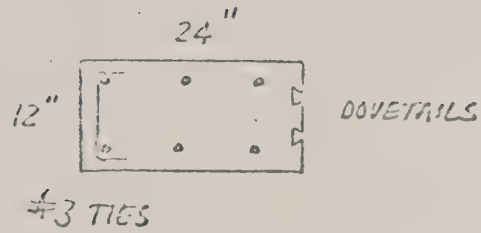


THIS PIECE WAS
FIRST MARKED T 28 .

IDENTIFIED AS COLUMN
D3, D4, G3, OR G4 FROM
GROUND TO 2nd FLOORS

Ground Fl.

WF 3



IDENTIFIED AS COLUMN

D3, D4, G3, G4 7th TO 16th FLOORS

OR

D2, G2 9th TO 16th FLOORS

OR

C6, H6, H7 11th TO 16th FLOORS

WF 10

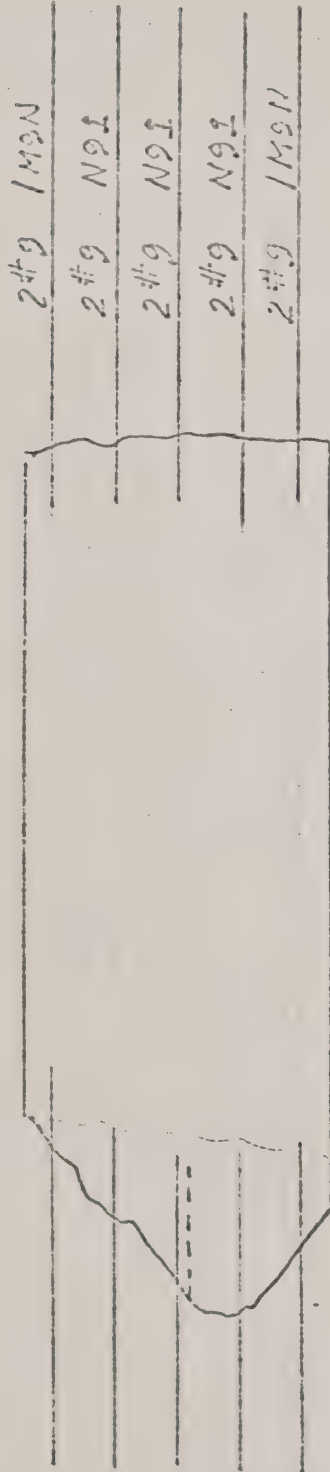
33"



12"

≈ 13'-4"

≈ 9'-6"



IDENTIFIED AS COLUMN
D3, D4, G3, OR G4 FROM
1ST BSMT. TO GRD. FLOOR

35"

MARK FOR STEEL
LAP FROM
BELOW

THE BUILDING COLLAPSE AT
2000 COMMONWEALTH AVENUE
BOSTON, MASSACHUSETTS

on

January 25, 1971

REPORT

OF

THE MAYOR'S INVESTIGATING COMMISSION

APPENDIX II. 2

CONCRETE AND REINFORCING STEEL DATA AND TEST RESULTS

JUNE 1971

APPENDIX II.2
CONCRETE AND REINFORCING STEEL DATA
AND TEST RESULTS

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by

The City of Boston, Massachusetts

APPENDIX II.2 (CONTINUED)

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APPENDIX II.2 (CONTINUED)

- Figure II.2.1o 4th Floor Slab - Columns To 5th Core And
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Location And Test Results
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TABLE II. 2.1a

RECORDS OF CONCRETE DELIVERIES AND INSPECTION PERFORMED

From the Delivery
Records of J.H. McNamee

From the Inspection Reports of Hub Testing Laboratories

<u>Date</u>	<u>Cubic Yards</u>	<u>f'c (PSI)</u>	<u>Location of Placement</u>	<u>Inspection at Batch Plant</u>	<u>Inspection of Site Placement</u>	<u>Cylinder Tests Made</u>	<u>Report Comments</u>
12/ 5/69	5	4000					
12/10/69	25	4000					
12/12/69	7	4000					
12/15/69	4	4000					
12/16/69	7-1/2	4000					
12/17/69	16	4000					
12/18/69	59	4000					
12/19/69	10	4000					
1/ 5/70	4	4000					
1/ 6/70	23	5000					
	18	4000	Footing F-1, A-9, F-9 B-11			X	
	15	3000					
1/ 7/70	8	5000					
	6	4000					
	10	3000					
1/ 8/70	10	4000					

TABLE II.2.1a RECORDS OF CONCRETE DELIVERIES AND INSPECTION PERFORMED

From the Delivery
Records of J.H. McNamara

From the Inspection Reports
of Hub Testing Laboratories

Date	Cubic Yards	f'c (PSI)	Location of Placement	Inspection at Batch Plant	Inspection of Site Placement	Cylinder Tests Made	Report Comments
1/ 9/70	14	5000					
	25	4000					
1/12/70	9	4000					
1/14/70	8	5000					
	2	4000					
	7	3000					
1/23/70	9	3000					
1/27/70	3	5000	Col. E-10 and H-10	X	X	X	Good Workable Mix. Forms Clean
	270	4000	First Basement Slab Lines 12 to 8-1/2	X	X	XXX	
	8	3000		X	X		
1/28/70	6	3000					
1/29/70	7	3000					
2/ 2/70	62	3000	Foundation Walls 12 line to line 7 Both Sides. Line H to D.	X	X	X	Workable Mix

TABLE II.2.1a

RECORDS OF CONCRETE DELIVERIES AND INSPECTION PERFORMED

From the Delivery
Records of J.H. McNamee

Date	Cubic Yards	f'c (PSI)	Location of Placement	Inspection at Batch Plant	Inspection of Site Placement	Cylinder Tests Made	Report Comments
2/ 2/70	3	2500		X	X		
2/ 6/70	10	2500					
2/ 9/70	15	2500					
2/11/70	7	2500					
2/18/70	5	2500					
2/19/70	3	4000					
	10	2500					
2/20/70	10	5000	Interior Wall Line 11 From D to GX. West	X	X	X	Forms Clean well mix
	30	4000	Exterior Wall Line C to H. West	X	X	X	
	15	2500		X	X		
3/ 3/70	15	2500					
3/ 4/70	5	5000	Columns J8-9-10-11 G-9-10	X	X	X	
	9	2500		X	X		
3/ 6/70	17	5000	Columns to Ground Floor	X	X	X	All Concrete proved workable
	289	4000	Ground Floor Slab	X	X	XXX	

TABLE II.2.1a

RECORDS OF CONCRETE DELIVERIES AND TESTS FOR 1970

From the Delivery
Records of J.H. Ichikawa

From the Inspection Reports
of Hub Testing Laboratories

Date	Cubic Yards	f'c (PSI)	Location of Placement	Inspection at Batch Plant	Inspection of Site Placement	Cylinder Tests Made	Report Comments
3/9/70	7-1/2	2500					
3/11/70	34-1/2	4000					
	1-1/2	3000					
3/12/70	41-1/2	4000					
3/17/70	1	4000					
3/18/70	3-1/2	4000					
	25	3000					
3/20/70	49	4000					
	7	3000					
3/23/70	28	4000					
3/24/70	25	4000					
	5	3000					
3/25/70	10	4000					
3/26/70	19	4000					
3/27/70	20	5000	Col. B-7-6-5-4 C-7-6-5-4 H-7-6-5-4 E-5 J-7-6-5-4	X	X	X	

TABLE II.2.1a

RECORDS OF CONCRETE DELIVERIES AND INSPECTION PERFORMED

From the Delivery
Records of J.H. Mellamara

From the Inspection Reports
of Hub Testing Laboratories

<u>Date</u>	<u>Cubic Yards</u>	<u>ft (PSI)</u>	<u>Location of Placoment</u>	<u>Inspection at Batch Plant</u>	<u>Inspection of Site Placoment</u>	<u>Cylinder Tests Made</u>	<u>Report Comments</u>
3/27/70	17	3000	Exterior Wall Lines 7 to Med. span on 3 & 4	X	X	X	
4/ 6/70	22	4000					
4/ 8/70	13	4000					
4/10/70	44	5000	Columns E-3, E-4, E-5, F-3, F-4, G-4	X	X	XX	Adjusted loads by adding water to get 4-1/2" - 5-1/2" Slump
	353	4000	Floor Slab First Level A to K, 8 to 1	X	X	XXX	
4/14/70	24	3000	Wall Line 1 from 8 to 4 From 1st Basement to Ground Floor	X	X	X	Forms Clean
4/15/70	40	3000		X			
4/17/70	46	5000		X			
4/24/70	37	5000		X	X	X	
	25	3000	Wall Line H to Between Line D & E	X	X		
4/30/70	19	5000	Columns on A Line	X	X	X	Visual inspection of truck

TABLE II.2.1a RECORDS OF CONCRETE DELIVERIES AND INSPECTION PERFORMED

From the Delivery
Records of J.H. McNamara

From the Inspection Reports
of Hub Testing Laboratories

Date	Cubic Yards	f'c (PSI)	Location of Placement	Inspection at Batch Plant	Inspection of Site Placement	Cylinder Tests Made	Report Comments
4/30/70	355	4000	Floor Slab Line A to Line and from Line 1 to Line 5	X	X	XXXX	
7/20/70	8	5000					
	48	4000					
7/22/70	64	5000	Column 1st floor Lines A-D, 5-12	X	X	X	Work satisfactory forms inadequately braced
	296	4000	2nd Floor Lines A-D, 5-12	X	X	XXX	
7/27/70	10	5000					
	30	4000					
7/29/70	9	5000					
8/ 3/70	19	5000	Columns to the 2nd Floor Line 1-5	X	X	X	
	130	4000	Slab 2nd Floor Lines 1-5	X	X	XX	
8/ 5/70	20	5000	Columns C-6 & 7 D-3,4,5,8,9,&10 E-3,4,5,8,9,10&11 F-3,4,5,8,9,10&11 H-5,6,8, G-10 & 9	X	X	X	Concrete thoroughly mixed

TABLE II.2.1a

RECORDS OF CONCRETE DELIVERIES AND INSPECTION PERFORMED

From the Delivery
Records of J.H. McNamara

From the Inspection Reports
of Hub Testing Laboratories

<u>Date</u>	<u>Cubic Yards</u>	<u>f'c (PSI)</u>	<u>Location of Placement</u>	<u>Inspection at Batch Plant</u>	<u>Inspection of Site Placement</u>	<u>Cylinder Tests Made</u>	<u>Report Comments</u>
8/5/70	14	3000	Elevator Shaft 2nd Floor	X	X	X	Concrete thoroughly mixed
8/6/70	207	4000	3rd Floor Deck	X	X	XX	Placement area clean
8/7/70	5	5000	3rd Floor Columns	X	X	X	Placement area clean
	60	4000	3rd Floor Slab	X	X	X	
8/12/70	20	5000	Columns 3rd to 4th Floor Lines 2 to 15, and D to T	X	X	X	Placement area clean
8/13/70	11-1/2	5000					
8/14/70	1	5000		X			
	284	4000		X			
8/17/70	51	3000					
8/18/70	76	3000					
8/19/70	64	3000	Fifth Floor Slab		X		Report M-2395-70 shows 9 Cylinders 8/19/70 - No Strength Reports Placement went well
8/20/70	18	5000	Column Lines 11 - Lines 5, 4th to 5th Floor	X	X		

TABLE II.2.1a

RECORDS OF CONCRETE DELIVERIES AND INSPECTION PERFORMED

From the Delivery
Records of J.H. McHamara

From the Inspection Reports
of Hub Testing Laboratories

<u>Date</u>	<u>Cubic Yards</u>	<u>ft/c (PSI)</u>	<u>Location of Placement</u>	<u>Inspection at Batch Plant</u>	<u>Inspection of Site Placement</u>	<u>Cylinder Tests Made</u>	<u>Report Comments</u>
8/21/70	25	5000	Columns 6-2 Lines and Elevator Shaft		X	X	Concrete workable
	73	3000	Basement Slab		X	X	
8/24/70	276	4000	Fifth Floor Deck Lines 2-11 Lines D-G	X		XXX	
8/27/70	42	5000	Columns 6th Floor Elevator Shaft	X	X	X	Work completed properly
8/28/70	2	5000		X	X		Work went well
	280	3000	6th Floor Deck	X	X	XXX	
9/ 2/70	50	4000	Footings, 7th Floor Columns	X	X	X	Placement area was clean and free of debris
9/ 3/70	3	4000		X	X		Placement area was clean and free of debris
	288	3000	7th Floor Slab Elevator Shaft	X	X	XXX	Placement area was clean
9/ 9/70	40	4000		X	X		Two (2) cold joints located in slab caused by delays
9/10/70	12	4000			X		
	220	3000			X		Placement area was clean
9/11/70	48	3000	8th Floor Slab		X	X	
9/18/70	0	3000	Cancelled	X			

TABLE II.2.1a

RECORDS OF CONCRETE DELIVERIES AND INSPECTION PERFORMED

From the Delivery
Records of J.M. McManara

From the Inspection Reports
of Hub Testing Laboratories

Date	Cubic Yards	f'c (PSI)	Location of Placement	Inspection at Batch Plant	Inspection of Site Placement	Cylinder Tests Made	Report Comments
9/21/70	39	4000	9th Floor Columns	X	X	X	Placement area was clean
	213	3000	9th Floor Deck	X	X	X	
9/22/70	10	4000	9th Floor Columns	X	X	X	Placement area was clean
	64	3000	9th Floor Deck	X	X	X	
9/23/70	5	3000					
9/25/70	30	4000					
9/28/70	49	4000					
	60	3000					
9/29/70	2	4000		X	X		
	214	3000	10th Floor Deck	X	X	XXX	Area clean
9/30/70	3	3000					
10/ 1/70	1	5000		X	X		Area clean and properl prepared
	42	4000	Basement floor	X	X	X	
10/ 5/70	44	4000	11th Floor Columns		X	X	Area clean and properl prepared
10/ 6/70	165	3000	Slab 11th Floor (West)	X		X	

TABLE II.2.1a

RECORDS OF CONCRETE DELIVERIES AND INSPECTION PERFORMED

From the Delivery

Records of J. A. McNamara

From the Inspection Reports
of Hub Testing Laboratories

Date	Cubic Yards	ft/c (PSI)	Location of Placement	Inspection at Batch Plant	Inspection of Site Placement	Cylinder Tests Made	Report Comments
10/ 7/70	126	3000	Slab 11th Floor (East)	X		X	
10/ 9/70	35	3000		X	X	X	Area clean and properly prepared
10/13/70	26-1/2	4000					
	5	3000					
10/14/70	14	4000	Elevator Slab	X	X		
	281	3000	12th Floor Slab	X	X	XX	
10/15/70	10	4000	West Stairs, 3rd Floor	X	X		Slump 4-1/2 inches
	8	3000	Far East Lower Retaining Wall	X	X		
10/16/70	8-1/2	3000					
10/20/70	38	3000	Columns	X	X	X	
10/21/70	292	3000	13th Floor Slab	X	X	XX	
10/23/70	12	3000					
10/26/70	39	4000	Plaza Level Ground Floor	X	X	X	Area clean and properly prepared
10/27/70	5	3000					

TABLE II.2.1a

RECORDS OF CONCRETE DELIVERIES AND INSPECTION PERFORMED

From the Delivery
Records of J.H. McManara

From the Inspection Reports
of Hub Testing Laboratories

Date	Cubic Yards	f'c (PSI)	Location of Placement	Inspection at Batch Plant	Inspection of Site Placement	Cylinder Tests Made	Report Comments
10/28/70	37	3000	14th Floor Columns	X		X	
10/29/70	102	3000	14th Floor Slab		X	X	
10/30/70	197	3000	14th Floor Slab		X	XX	
11/ 2/70	9	3000					
11/ 3/70	15	3000					
11/ 4/70	46	3000					
11/ 5/70	96	3000	Slab 15th Floor		X	X	
11/ 6/70	92	3000	15th Floor Slab		X	X	
11/ 9/70	120	3000	15th Floor Slab		X	X	
11/10/70	27	3000					
11/12/70	15	3000					
11/13/70	6	3000					
11/16/70	13	3000					
11/17/70	25	3000		X			
11/18/70	212	3000	16th Floor Slab		X	XX	

TABLE II.2.1a

RECORDS OF CONCRETE DELIVERIES AND INSPECTION PERFORMED

From the Delivery
Records of J.H. McNamara

From the Inspection Reports
of Hub Testing Laboratories

Date	Cubic Yards	ft/c (PSI)	Location of Placement	Inspection at Batch Plant	Inspection of Site Placement	Cylinder Tests Made	Report Comments
11/19/70	8	3000			X	X	
11/20/70	76	3000	16th Floor Slab Stairs and Parapets	X	X	X	
11/23/70	5	3000	Rear Steps	X			
11/24/70	160	3000	Lower Basement	X	X		
11/25/70	9	2500					
11/27/70	3	3000					
12/ 1/70	35	3000					
12/ 2/70	7	3000					
12/ 3/70	218	3000	16th Floor Roof	X	X	XXX	
12/ 7/70					X		Placement cancelled
12/ 9/70	95	3000					
12/10/70	10	3000					
12/14/70	6	3000					
12/16/70	10	3000					
12/23/70	3	3000					

TABLE II.2.1a

RECORDS OF CONCRETE DELIVERIES AND INSPECTION PERFORMED

From the Delivery Records of J.H. McNamara		From the Inspection Reports of Hub Testing Laboratories					
Date	Cubic Yards	ft's (PSI)	Location of Placement	Inspection at Batch Plant	Inspection of Site Placement	Cylinder Tests Made	Report Comments
12/28/70	10	3000					
12/31/70	5	3000					
1/ 4/71	9	3000					
1/ 5/71	3	3000					
1/ 7/71	13	3000					
1/11/71	8	3000					
1/14/71	10-1/2	3000					
1/15/71	9	3000					
1/21/71	8	3000					
1/25/71	140	3000					
132 Days							
Total	8899			44 Days Plus 1 Cancelled	49 Days Plus 1 Cancelled	87 Sots 02	46 Days

TABLE II.2.1b

RECORDS OF CONCRETE MIXTURES DELIVERED TO
2000 COMMONWEALTH AVENUE BY J. H. McMAKARA

AS SHOWN ON INVOICES

<u>Date</u>	<u>Cubic Yards</u>	<u>f.c. (PSI)</u>	<u>Cement (Lbs)</u>	<u>Gravel Size</u>	<u>Type</u>	<u>1% Cal.</u>	<u>2% Cal.</u>	<u>WRDA</u>	<u>Darcz</u>
12/ 5/69	5	4000	580	3/4					
12/10/69	25	4000	580						
12/12/69	7	4000							
12/15/69	4	4000	580						
12/16/69	7-1/2	4000							
12/17/69	16	4000		3/4					
12/18/69	59	4000	640		PUMP				
12/19/69	10	4000	580						
1/ 5/70	4	4000	580	3/4					
1/ 6/70	23	5000	705		PUMP				
1/ 6/70	18	4000	580						
1/ 6/70	15	3000	640		PUMP				
1/ 7/70	8	5000	705						
1/ 7/70	6	4000	580						
1/ 7/70	10	3000	540	3/4					
1/ 8/70	10	4000	580						
1/ 9/70	14	5000	705		PUMP				

TABLE II.2.1b

RECORDS OF CONCRETE MIXTURES DELIVERED TO2000 COMMONWEALTH AVENUE BY J. H. MCNAMARAAS SHOWN ON INVOICES

<u>Date</u>	<u>Cubic Yards</u>	<u>f'c (PSI)</u>	<u>Cement (Lbs)</u>	<u>Gravel Size</u>	<u>Type</u>	<u>1½ Cal.</u>	<u>2½ Cal.</u>	<u>WRDA</u>	<u>Darcy</u>
1/9/70	25	4000	640		PUMP				
1/12/70	9	4000	640		PUMP				
1/14/70	8	5000	705		PUMP				
1/14/70	2	4000	640						
1/14/70	7	3000	640						
1/23/70	9	3000	540						
1/27/70	3	5000	705						
1/27/70	94	4000	580						
1/27/70	176	4000	580				X		
1/27/70	8	3000							
1/28/70	6	3000		¾					
1/29/70	7	3000							
2/ 2/70	62	3000	540	¾					
2/ 2/70	3	2500							
2/ 6/70	10	2500							
2/ 9/70	15	2500							
2/11/70	7	2500							

TABLE II.2.1b

RECORDS OF CONCRETE MIXTURES DELIVERED TO2000 COMMONWEALTH AVENUE BY J. H. MONAHANAS SHOWN ON INVOICES

<u>Date</u>	<u>Cubic Yards</u>	<u>f'c (PSI)</u>	<u>Cement (Lbs)</u>	<u>Gravel Size</u>	<u>Type</u>	<u>1% Cal.</u>	<u>2% Cal.</u>	<u>WRDA</u>	<u>Darcy</u>
2/18/70	5	2500							
2/19/70	3	4000	580	3/4					
2/19/70	10	2500							
2/20/70	18	5000	705		PUMP				
2/20/70	30	4000	640		PUMP				
2/20/70	15	2500		3/4					
3/ 3/70	15	2500							
3/ 4/70	5	5000	705						
3/ 4/70	9	2500							
3/ 6/70	17	5000	705						
3/ 6/70	289	4000	580						
3/ 9/70	7-1/2	2500							
3/11/70	34-1/2	4000	580	3/4					
3/11/70	1-1/2	3000		3/4					
3/12/70	41-1/2	4000	580						
3/17/70	1	4000	580	3/4					
3/18/70	3-1/2	4000	580						

TABLE II.2.1b

RECORDS OF CONCRETE MIXTURES DELIVERED TO

2000 COMMONWEALTH AVENUE BY J. H. McNAUL & SONS

AS SHOWN ON INVOICES

<u>Date</u>	<u>Cubic Yards</u>	<u>ft. (PSI.)</u>	<u>Cement (lbs.)</u>	<u>Gravel Size</u>	<u>Type</u>	<u>1% Cal.</u>	<u>2% Cal.</u>	<u>WRDA</u>	<u>Darex</u>
3/18/70	25	3000	540						
3/20/70	49	4000	580						
3/20/70	7	3000	540						
3/23/70	28	4000	580						
3/24/70	25	4000	580	3/4					
3/24/70	5	3000	540						
3/25/70	10	4000	580	3/4					
3/26/70	19	4000	580						
3/27/70	20	5000	705						
3/27/70	17	3000	640		PUMP				
4/ 6/70	22	4000	580						
4/ 8/70	13	4000	580						
4/10/70	144	5000	705						
4/10/70	353	4000	580						
4/14/70	24	3000	540						
4/15/70	40	3000	540						
4/17/70	46	5000							

TABLE II.2.1b

RECORDS OF CONCRETE MIXTURES DELIVERED TO
2000 COMMONWEALTH AVENUE BY J. H. KOMAKURA

AS SHOWN ON INVOICES

<u>Date</u>	<u>Cubic Yards</u>	<u>fc (PSI)</u>	<u>Coment (lbs)</u>	<u>Gravel Size</u>	<u>Type</u>	<u>1% Cal.</u>	<u>2% Cal.</u>	<u>WRDA</u>	<u>Darex</u>
4/24/70	37	5000	705						
4/24/70	25	3000	580		PUMP				
4/30/70	19	5000	705						
4/30/70	355	4000	580						
7/20/70	8	5000							
7/20/70	48	4000							
7/22/70	64	5000	705						
7/22/70	296	4000	580						X
7/27/70	10	5000	705						
7/27/70	30	4000	580						
7/29/70	9	5000	705						
8/ 3/70	19	5000							
8/ 3/70	130	4000	580						X
8/ 5/70	20	5000	705						
8/ 5/70	14	3000	540						
8/ 6/70	207	4000	580						X
8/ 7/70	5	5000	705						

TABLE II.2.1b

RECORDS OF CONCRETE MIXTURES DELIVERED TO
2000 COMMONWEALTH AVENUE BY J. H. McMAHARA

AS SHOWN ON INVOICES

<u>Date</u>	<u>Cubic Yards</u>	<u>f'c (PSI)</u>	<u>Cement (Lbs)</u>	<u>Gravol Size</u>	<u>Type</u>	<u>1% Cal.</u>	<u>2% Cal.</u>	<u>WRDA</u>	<u>Darex</u>
8/7/70	60	4000							
8/12/70	20	5000	705						X
8/13/70	11-1/2	5000	705						X
8/14/70	1	5000							
8/14/70	284	4000	580						
8/17/70	51	3000	540			X			
8/18/70	76	3000	540			X			
8/19/70	64	3000				X			
8/20/70	18	5000	705						
8/21/70	25	5000							
8/21/70	40	3000							
8/21/70	16	3000					X		
8/21/70	17	3000				X			
8/24/70	200	4000	580						X
8/24/70	76	4000							
8/27/70	42	5000	705						
8/28/70	2	5000							

TABLE II.2.2b

RECORDS OF CONCRETE MIXTURES DELIVERED TO

2000 COMMONWEALTH AVENUE BY J. H. McMAHON

AS SHOWN ON INVOICES

<u>Date</u>	<u>Cubic Yards</u>	<u>ft.c (PSI)</u>	<u>Cement (Lbs.)</u>	<u>Gravel Size</u>	<u>Type</u>	<u>1% Cal.</u>	<u>2% Cal.</u>	<u>WRDA</u>	<u>Darex</u>
8/28/70	260	3000	540						X
8/28/70	20	3000	540			X			
9/ 2/70	50	4000	580						X
9/ 3/70	3	4000				X			
9/ 3/70	64	3000	540			X			
9/ 3/70	224	3000	540						
9/ 9/70	40	4000	580						X
9/10/70	12	4000	580						
9/10/70	38	3000	540						X
9/10/70	182	3000	540			X			
9/11/70	48	3000	540			X			
9/21/70	39	4000	580						
9/21/70	213	3000	540						
9/22/70	10	4000	580						
9/22/70	64	3000				X			
9/23/70	5	3000	540			X			
9/25/70	30	4000							X

TABLE II.2.1b

RECORDS OF CONCRETE MIXTURES DELIVERED TO

2000 COMMONWEALTH AVENUE BY J. H. McNAMARA

AS SHOWN ON INVOICES

<u>Date</u>	<u>Cubic Yards</u>	<u>f'c (PSI)</u>	<u>Cement (Lbs)</u>	<u>Gravel Size</u>	<u>Type</u>	<u>1% Cal.</u>	<u>2% Cal.</u>	<u>WRDA</u>	<u>Darex</u>
9/28/70	49	4000							
9/28/70	60	3000							
9/29/70	2	4000							
9/29/70	244	3000	540			X			
9/30/70	3	3000	H1 EARLY						
10/1/70	1	5000							
10/1/70	42	4000							
10/5/70	44	4000	580						X
10/6/70	165	3000	540			X			
10/7/70	126	3000							
10/9/70	25	3000	540						
10/9/70	10	3000	611		Pea				
10/13/70	26-1/2	4000							
10/13/70	5	3000				X			
10/14/70	14	4000	580						
10/14/70	198	3000	540						X
10/14/70	83	3000	540			X			

TABLE II.2.1b

RECORDS OF CONCRETE MIXTURES DELIVERED TO2000 COMMONWEALTH AVENUE BY J. H. McNAMARAAS SHOWN ON INVOICES

<u>Date</u>	<u>Cubic Yards</u>	<u>fc (PSI)</u>	<u>Cement (Lbs)</u>	<u>Gravel Size</u>	<u>Type</u>	<u>1% Cal.</u>	<u>2% Cal.</u>	<u>WRDA</u>	<u>Darex</u>
10/15/70	10	4000							
10/15/70	8	3000							
10/16/70	5	3000	540						
10/16/70	3-1/2	3000					X		
10/20/70	38	3000	540						
10/21/70	201	3000	540						X
10/21/70	91	3000	540			X			
10/23/70	9	3000			Pea				
10/23/70	3	3000	540						
10/26/70	39	4000	580						
10/27/70	5	3000	540				X		
10/28/70	1	3000			Cal				
10/28/70	36	3000							
10/29/70	102	3000	540						
10/30/70	71	3000	540				X		
10/30/70	126	3000	540						
11/ 2/70	9	3000			Pea				

TABLE II.2.1b

RECORDS OF CONCRETE MIXTURES DELIVERED TO

2000 COMMONWEALTH AVENUE BY J. H. McNAMARA

AS SHOWN ON INVOICES

<u>Date</u>	<u>Cubic Yards</u>	<u>f'c (PSI)</u>	<u>Cement (lbs)</u>	<u>Gravel Size</u>	<u>Type</u>	<u>1% Cal.</u>	<u>2% Cal.</u>	<u>WRDA</u>	<u>Darex</u>
11/3/70	15	3000		3/4			X		
11/4/70	46	3000							
11/5/70	96	3000	540						
11/6/70	92	3000	540	3/4					
11/9/70	78	3000	540						X
11/9/70	42	3000	540			X			
11/10/70	8	3000							
11/10/70	9	3000			Pea				
11/10/70	10	3000	540	3/4		X			
11/12/70	10	3000	540						X
11/12/70	5	3000				X			
11/13/70	6	3000	540						
11/16/70	13	3000							
11/17/70	25	3000							
11/18/70	37	3000	540			X			
11/18/70	175	3000	540						X
11/19/70	8	3000							

RECORDS OF CONCRETE MIXTURES DELIVERED TO

2000 COMMONWEALTH AVENUE BY J. H. McNAMARA

AS SHOWN ON INVOICES

Date	Cubic Yards	f'c (PSI)	Cement (Lbs)	Gravel Size	Type	1% Cal.	2% Cal.	WRDA	Darex
11/20/70	76	3000				X			
11/23/70	5	3000							
11/24/70	160	3000	580		PUMP				
11/25/70	9	2500							
11/27/70	3	3000			Pea				
12/1/70	35	3000							
12/2/70	7	3000							
12/3/70	218	3000							
12/9/70	85	3000	540	3/4					
12/9/70	10	3000			Cal				
12/10/70	10	3000				X			
12/14/70	6	3000			Pea	X			
12/16/70	3	3000					X		
12/16/70	7	3000				X			
12/23/70	3	3000		3/4				X	
12/28/70	10	3000							
12/31/70	5	3000		3/4					

TABLE II.2.1b

RECORDS OF CONCRETE MIXTURES DELIVERED TO2000 COMMONWEALTH AVENUE BY J. H. McHAMPAS SHOWN ON INVOICES

<u>Date</u>	<u>Cubic Yards</u>	<u>f'c (PSI)</u>	<u>Cement (lbs)</u>	<u>Gravel Size</u>	<u>Type</u>	<u>1% Cal.</u>	<u>2% Cal.</u>	<u>WRDA</u>	<u>Darex</u>
1/4/71	9	3000		3/4		X			
1/5/71	3	3000				X			
1/7/71	13	3000			Pea	X			
1/11/71	8	3000			Pea				
1/14/71	2-1/2	3000		3/4		X			
1/14/71	8	3000			Pea				
1/15/71	9	3000			Pea				
1/21/71	8	3000			Pea				
1/25/71	140	3000	540						X

TABLE II.2.2 TEST RESULTS FROM HUB TESTING LABORATORY REPORTS

<u>6"x12" Cylinder Tests</u>						
<u>Concrete Delivery Date</u>	<u>Specified f'c at 28 Days (PSI)</u>	<u>Specified Slump (Inches)</u>	<u>Slump Test (Inches)</u>	<u>Test Date</u>	<u>Age at Test</u>	<u>f'c (PSI)</u>
1/ 6/70	4000	2-1/2 to 3-1/2		1/13/70	7	2088
				2/ 3/70	28	3080, 3284
1/27/70	5000	2-1/2 to 3-1/2	4	2/ 3/70	7	4366
				2/24/70	28	5256, 5300
"	4000	2-1/2 to 3-1/2	4-1/2	2/ 3/70	7	3490
				2/24/70	28	4186, 4417
"	4000	2-1/2 to 3-1/2	4-1/2	2/ 3/70	7	3568
				2/24/70	28	4417, 4496
"	4000	2-1/2 to 3-1/2	4-1/2	2/ 3/70	7	3448
				2/24/70	28	4385, 4524
2/ 2/70	3000	2-1/2 to 3-1/2	4	2/ 9/70	7	3780
				3/ 2/70	28	4196, 4238
2/20/70	5000	2-1/2 to 3-1/2	4-1/2	3/ 2/70	10	4421
				3/20/70	28	5004, 5053
"	4000	2-1/2 to 3-1/2	4-1/2	2/27/70	7	2825
				3/20/70	28	4051, 4238
3/ 4/70	5000	2-1/2 to 3-1/2	4-1/2	3/11/70	7	3911
				4/ 1/70	28	4880, 4940
3/ 6/70	5000	2-1/2 to 3-1/2	4	3/13/70	7	4309
				4/ 3/70	28	5238, 5321
"	4000	2-1/2 to 3-1/2	4-1/2	3/13/70	7	3115
				4/ 3/70	28	4263, 4560
"	4000	2-1/2 to 3-1/2	4-1/2	3/13/70	7	3151
				4/ 3/70	28	4263, 4238
"	4000	2-1/2 to 3-1/2	4-1/2	3/13/70	7	3345
				4/ 3/70	28	4090, 4080

TABLE II.2.2 TEST RESULTS FROM HUB TESTING LABORATORY REPORTS6"x12" Cylinder Tests

<u>Concrete Delivery Date</u>	<u>Specified f'c at 28 Days (PSI)</u>	<u>Specified Slump (Inches)</u>	<u>Slump Test (Inches)</u>	<u>Test Date</u>	<u>Age at Test</u>	<u>f'c (PSI)</u>
3/27/70	5000	2-1/2 to 3-1/2	4-1/2	4/ 3/70	7	3840
					28	5689, 5638
"	3000	2-1/2 to 3-1/2	4-1/2	4/24/70	7	2324
					28	3144, 3249
4/10/70	5000	2-1/2 to 3-1/2	4-1/2	4/17/70	7	4435
				5/ 8/70	28	5160, 5341
"	4000	2-1/2 to 3-1/2	5	4/17/70	7	3236
				5/ 8/70	28	4099, 4315
"	4000	2-1/2 to 3-1/2	5	4/17/70	7	3367
				5/ 8/70	28	4276, 4368
"	5000	2-1/2 to 3-1/2	5	4/17/70	7	4309
					28	No Test Results
"	4000	2-1/2 to 3-1/2	5	4/17/70	7	3572
					28	No Test Results
4/14/70	3000	2-1/2 to 3-1/2	3-1/2	5/12/70	28	3673
				5/12/70	28	3694, 3568
4/24/70	5000	2-1/2 to 3-1/2	4	5/ 1/70	7	3714
				5/22/70	28	5078, 5159
4/30/70	5000	2-1/2 to 3-1/2	4	5/ 7/70	7	3533
				5/28/70	28	5053, 5235
"	4000	2-1/2 to 3-1/2	5	5/ 7/70	7	3006
				5/28/70	28	4122, 4030
"	4000	2-1/2 to 3-1/2	5	5/ 7/70	7	3130
				5/28/70	28	4196, 4097

TABLE II.2.2 TEST RESULTS FROM HUB TESTING LABORATORY REPORTS

Concrete Delivery Date	Specified f'c at 28 Days (PSI)	Specified Slump (Inches)	Slump Test (Inches)	<u>6"x12" Cylinder Tests</u>		
				Test Date	Age at Test	f'c (PSI)
4/30/70	4000	2-1/2 to 3-1/2	5	5/7/70	7	3038
				5/28/70	28	4133, 4242
"	4000	2-1/2 to 3-1/2	5	5/7/70	7	2680
				5/28/70	28	4054, 4066
7/22/70	5000	2-1/2 to 3-1/2	4	7/29/70	7	3929
				8/19/70	28	5071, 5123
"	4000	2-1/2 to 3-1/2	4	7/29/70	7	2808
				8/19/70	28	4094, 4080
"	4000	2-1/2 to 3-1/2	4	7/29/70	7	2773
				8/19/70	28	4087, 4026
"	4000	2-1/2 to 3-1/2	4	7/29/70	7	2822
				8/19/70	28	4133, 4026
8/3/70	5000	2-1/2 to 3-1/2	4-3/4	8/10/70	7	3522
				8/31/70	28	5213, 5018
"	4000	2-1/2 to 3-1/2	4	8/10/70	7	2957
				8/31/70	28	4244, 4301
"	4000	2-1/2 to 3-1/2	4-1/2	8/10/70	7	3045
				8/31/70	28	4199, 4120
8/5/70	5000	2-1/2 to 3-1/2	5	8/12/70	7	3031
				9/2/70	28	4481, 4595
"	3000	2-1/2 to 3-1/2	4	8/12/70	7	2317
				9/2/70	28	3568, 3490
8/6/70	4000	2-1/2 to 3-1/2	5	8/13/70	7	2740
				9/3/70	28	4051, 4062
"	4000	2-1/2 to 3-1/2	5	8/13/70	7	2843
				9/3/70	28	4012, 4097

TABLE II.2.2 TEST RESULTS FROM HUB TESTING LABORATORY REPORTS

<u>6"x12" Cylinder Tests</u>						
<u>Concrete Delivery Date</u>	<u>Specified f'c at 28 Days (PSI)</u>	<u>Specified Slump (Inches)</u>	<u>Slump Test (Inches)</u>	<u>Test Date</u>	<u>Age at Test</u>	<u>f'c (PSI)</u>
8/ 7/70	5000	2-1/2 to 3-1/2	5	8/14/70	7	3356
				9/ 4/70	28	4940, 4771
"	4000	2-1/2 to 3-1/2	5	8/14/70	7	2740
				9/ 4/70	28	4026, 4094
8/12/70	5000	2-1/2 to 3-1/2	4-1/2	8/19/70	7	3484
					28	No Test Results
8/21/70	5000	2-1/2 to 3-1/2	4	8/28/70	7	3883
					28	No Test Results
"	3000	2-1/2 to 3-1/2	4	8/28/70	7	2607
					28	No Test Results
8/24/70	4000	2-1/2 to 3-1/2	4-1/2	8/31/70	7	2820
					28	No Test Results
"	4000	2-1/2 to 3-1/2	5	8/31/70	7	2812
					28	No Test Results
"	4000	2-1/2 to 3-1/2	5	8/31/70	7	2829
					28	No Test Results
8/27/70	5000	2-1/2 to 3-1/2	3-1/2	9/ 3/70	7	3458
					28	No Test Results
8/28/70	3000	2-1/2 to 3-1/2	4	9/ 4/70	7	2599
					28	No Test Results

TABLE II.2.2

TEST RESULTS FROM HUB TESTING LABORATORY REPORTS6"x12" Cylinder Tests

<u>Concrete Delivery Date</u>	<u>Specified f'c at 28 Days (PSI)</u>	<u>Specified Slump (Inches)</u>	<u>Slump Test (Inches)</u>	<u>Test Date</u>	<u>Age at Test</u>	<u>f'c (PSI)</u>
8/28/70	3000	2-1/2 to 3-1/2	4-1/4	9/4/70	7	2455
					28	No Test Results
"	3000	2-1/2 to 3-1/2	4	9/4/70	7	2402
					28	No Test Results
9/2/70	4000	2-1/2 to 3-1/2	4-3/4	9/9/70	7	2821
				9/30/70	28	3891, 3802
9/3/70	3000	2-1/2 to 3-1/2	4-1/2	9/10/70	7	2825
				10/1/70	28	3632, 3742
"	3000	2-1/2 to 3-1/2	4-3/4	9/10/70	7	2723
				10/1/70	28	3448, 3608
9/3/70	3000	2-1/2 to 3-1/2	4-1/2	9/10/70	7	2533
				10/1/70	28	3523, 3484
9/11/70	3000	2-1/2 to 3-1/2	5	9/18/70	7	2367
				10/9/70	28	3572, 3448
9/21/70	4000	2-1/2 to 3-1/2	5	9/28/70	7	2681
				10/19/70	28	3739, 3887
"	3000	2-1/2 to 3-1/2	5-1/2	9/28/70	7	2387
				10/19/70	28	3134, 3095
9/22/70	3000	2-1/2 to 3-1/2	4-3/4	9/29/70	7	2759
				10/20/70	28	3420, 3431
9/29/70	3000	2-1/2 to 3-1/2	6-1/2	10/6/70	7	2129
				10/27/70	28	3155, 3112
"	3000	2-1/2 to 3-1/2	6-3/4	10/6/70	7	2370
				10/27/70	28	3293, 3130
"	3000	2-1/2 to 3-1/2	5-1/4	10/6/70	7	2573
				10/27/70	28	3285, 3325

TABLE II.2.2 TEST RESULTS FROM HUB TESTING LABORATORY REPORTS6"x12" Cylinder Tests

<u>Concrete Delivery Date</u>	<u>Specified f'c at 28 Days (PSI)</u>	<u>Specified Slump (inches)</u>	<u>Slump Test (Inches)</u>	<u>Test Date</u>	<u>Age at Test</u>	<u>f'c (PSI)</u>
10/ 1/70	4000	2-1/2 to 3-1/2	4	10/ 8/70	7	2979
					28	No Test Results
10/ 5/70	4000	2-1/2 to 3-1/2	5-1/4	10/12/70	7	2652
				11/ 2/70	28	3972, 3926
10/ 6/70	3000	2-1/2 to 3-1/2	No Data	No Data	7	No Test Results
					28	No Test Results
10/ 7/70	3000	2-1/2 to 3-1/2	No Data	No Data	7	No Test Results
					28	No Test Results
10/ 9/70	3000	2-1/2 to 3-1/2	5-1/4	10/16/70	7	2409
					28	No Test Results
10/14/70	3000	2-1/2 to 3-1/2	3-1/2	10/21/70	7	2405
					28	No Test Results
"	3000	2-1/2 to 3-1/2	3-1/2	10/21/70	7	2338
					28	No Test Results
10/20/70	3000	2-1/2 to 3-1/2	4-1/2	10/27/70	7	2257
					28	No Test Results
10/21/70	3000	2-1/2 to 3-1/2	3-1/2	10/28/70	7	2476
					28	No Test Results
"	3000	2-1/2 to 3-1/2	3-1/2	10/28/70	7	2564
					28	No Test Results

TABLE II.2.2 TEST RESULTS FROM HUB TESTING LABORATORY REPORTS

<u>6"x12" Cylinder Tests</u>						
<u>Concrete Delivery Date</u>	<u>Specified f'c at 28 Days (PSI)</u>	<u>Specified Slump (Inches)</u>	<u>Slump Test (Inches)</u>	<u>Test Date</u>	<u>Age at Test</u>	<u>f'c (PSI)</u>
10/26/70	4000	2-1/2 to 3-1/2	4-3/4	11/ 2/70	7	3003
					28	No Test Results
10/28/70	4000	2-1/2 to 3-1/2	5	11/ 4/70	7	3003
				11/25/70	28	3748, 3833
10/29/70	3000	2-1/2 to 3-1/2	3	11/ 5/70	7	2323
					28	No Test Results
10/30/70	3000	2-1/2 to 3-1/2	3	11/ 6/70	7	2759
					28	No Test Results
"	3000	2-1/2 to 3-1/2	3-1/4	11/ 6/70	7	2582
					28	No Test Results
11/ 5/70	3000	2-1/2 to 3-1/2	3-1/4	11/12/70	7	2370
					28	No Test Results
11/ 6/70	3000	2-1/2 to 3-1/2	3-1/2	11/13/70	7	2436
					28	No Test Results
11/ 9/70	3000	2-1/2 to 3-1/2	3-1/2	11/16/70	7	2405
					28	No Test Results
11/18/70	3000	2-1/2 to 3-1/2	5-1/4	11/25/70	7	2596
				12/16/70	28	3207, 3077
"	3000	2-1/2 to 3-1/2	5-1/4	11/25/70	7	2084
				12/16/70	28	2829, 2798
11/19/70	3000	2-1/2 to 3-1/2	3-1/2	11/26/70	7	2420
				12/17/70	28	3038, 3119

TABLE II.2.2 TEST RESULTS FROM HUB TESTING LABORATORY REPORTS

6"x12" Cylinder Tests

<u>Concrete Delivery Date</u>	<u>Specified f'c at 28 Days (PSI)</u>	<u>Specified Slump (Inches)</u>	<u>Slump Test (Inches)</u>	<u>Test Date</u>	<u>Age at Test</u>	<u>f'c (PSI)</u>
11/20/70	3000	2-1/2 to 3-1/2	3-1/4	11/27/70	7	2335
				12/18/70	28	3395, 3427
12/ 3/70	3000	2-1/2 to 3-1/2	3	12/10/70	7	2260
					28	No Test Results
"	3000	2-1/2 to 3-1/2	3-1/2	12/10/70	7	2183
					28	No Test Results
"	3000	2-1/2 to 3-1/2	3	12/10/70	7	2317
					28	No Test Results

TABLE II.2.3

COMPRESSIVE STRENGTH TEST RESULTS FOR
CORES TAKEN FROM THE UNCOLLAPSED PORTION
OF THE STRUCTURE

<u>Location Of Core Column Lines</u>	<u>Core Diam- eter</u>	<u>Date Sampled</u>	<u>Date Tested</u>	<u>Lab. Identi- fication</u>	<u>f'_c (PSI)</u>	<u>Comments & De- sign Strength at 28 Days (PSI)</u>
Pent House Slab E 1/2 - 8-1/2	4"	3/13/71	3/15/71	RR-363 PH-1	2690	Bottom Trimmed 3000
Pent House Slab E 2/3 - 7	4"	3/13/71	3/15/71	RR-363 PH-2	2320	Bottom Trimmed 3000
Main Roof Slab F 1/2 - 8-1/3	4"	3/13/71	3/15/71	RR-363 R-1	2240	Top and Bottom Trimmed 3000
Main Roof Slab D 10 - 1/2	4"	3/13/71	3/15/71	RR-363 R-2	2710	Includes end of #5 rein- forcing bar in tested portion of core 3000
Main Roof Slab D 1/2 - 7-1/4	4"	3/13/71	3/15/71	RR-363 R-3	3010	Bottom Trimmed 3000
Main Roof Slab E 1/2 - 7-1/4	4"	3/13/71	3/15/71	RR-363 R-4	2800	Bottom Trimmed 3000
Main Roof Slab E 1/2 - 9	4"	3/18/71	3/20/71	RR-387 R-5	2050	3000
Main Roof Slab F 3/4 - 10-3/4	4"	3/18/71	3/20/71	RR-387 R-6	2580	3000
16th Floor Slab D 1/2 - 8-1/2	4"	3/13/71	3/15/71	RR-363 16-1	3710	Bottom Trimmed 3000
16th Floor Slab E 3/4 - 8-1/2	4"	3/13/71	3/15/71	RR-363 16-2	3350	Bottom Trimmed 3000
16th Floor Slab E 2/3 - 7-1/4	4"	3/13/71	3/15/71	RR-363 16-3	3440	Bottom Trimmed 3000
16th Floor E - 8 Column	2-1/4"	3/18/71	3/20/71	RR-387 16-4	2780	3000
15th Floor Slab D 1/2 - 10-1/2	4"	3/13/71	3/15/71	RR-363 15-1	3560	Bottom Trimmed 3000
15th Floor Slab D 1/2 - 7-1/2	4"	3/15/71	3/17/71	RR-366 15-2A	3330	Bottom Trimmed 3000

TABLE II.2.3

COMPRESSIVE STRENGTH TEST RESULTS FOR
CORES TAKEN FROM THE UNCOLLAPSED PORTION
OF THE STRUCTURE

<u>Location Of Core Column Lines</u>	<u>Core Diam- eter</u>	<u>Date Sampled</u>	<u>Date Tested</u>	<u>Lab. Identi- fication</u>	<u>f'_c (PSI)</u>	<u>Comments & De- sign Strength at 28 Days (PSI)</u>
14th Floor Slab F 1/3 - 10-1/2	4"	3/15/71	3/17/71	RR-366 14-1	3950	Bottom Trimmed 3000
14th Floor Slab F 1/3 - 8-1/2	4"	3/15/71	3/17/71	RR-366 14-2	4180	Bottom Trimmed 3000
13th Floor Slab D 1/3 - 7-1/2	4"	3/15/71	3/17/71	RR-366 13-1	3270	Bottom Trimmed 3000
12th Floor Slab E 1/2 - 8-1/2	4"	3/15/71	3/17/71	RR-366 12-1	3650	3000
10th Floor Slab D 1/2 - 8-1/2	4"	3/15/71	3/17/71	RR-366 10-1	3220	Bottom Trimmed 3000
7th Floor Slab F 1/2 - 8-1/3	4"	3/15/71	3/17/71	RR-366 7-1	3620	Bottom Trimmed 3000
3rd Floor Slab E 1/2 - 7-1/4	4"	3/15/71	3/17/71	RR-366 3-1	3830	Bottom Trimmed 4000
Ground Floor Column D-8	2-1/4"	3/18/71	3/20/71	RR-387 G-1	4480	5000
Ground Floor Column F-8	2-1/4"	3/18/71	3/20/71	RR-387 G-2	6040	5000
Basement Elevator Shaft E - 7	2-1/4"	3/18/71	3/20/71	RR-387 B-1	4790	5000

Reports of Test of Concrete Cores; RR-363, RR-366, RR-387 follows:

TEST OF CONCRETE CORES

BUILDING COLLAPSE
2000 COMMONWEALTH AVENUE
BRIGHTON, MASSACHUSETTS

Test Number - RR 363
Date Received - 3-13-71 Date Tested 3-15-71
Source - Sampled by T&L at project site on 3-13-71
Samples - Ten nominal 4" diameter concrete cores
marked PH-1, PH-2, R-1, R-2, R-3, R-4, 16-1,
16-2, 16-3, 15-1
Test Procedure - ASTM Designation: C42-68 methods where they
apply

<u>Specimen Mark</u>	<u>PH-1</u>	<u>PH-2</u>	<u>R-1</u>	<u>R-2*</u>	<u>R-3</u>
Core Dimensions, inches					
Length as Received	8-1/4	8-5/16	6	6-3/4	7-1/4
Diameter	3-15/16	3-15/16	3-15/16	3-15/16	3-15/16
Length as Trimmed	7-15/32	7-5/8	3-5/8	5-15/16	6-1/2
Length after Capping	7-19/32	7-3/4	3-13/16	6-1/8	6-11/16
Concrete Density as Tested, SSD, pcf	146.8	146.5	145.4	148.1	144.6
Uncorrected Compressive Strength, psi	2710	2320	2460	2790	3080
Corrected Compressive Strength, psi	2690	2320	2240	2710	3010
Nominal Maximum Size of Aggregate, Inches	3/4	3/4	3/4	3/4	3/4

* Includes end of #5 reinforcing bar in tested portion of core.

Test Number - RR 363 (Continued)

<u>Specimen Mark</u>	<u>R-1</u>	<u>16-1</u>	<u>16-2</u>	<u>16-3</u>	<u>15-1</u>
Core Dimensions, inches					
Length as Received	6-7/16	7-5/16	7-1/16	6-13/16	8
Diameter	3-15/16	3-15/16	3-15/16	3-15/16	3-15/16
Length as Trimmed	6-5/32	6-15/32	6-3/8	6-3/8	6-1/16
Length after Capping	6-5/16	6-9/16	6-15/32	6-7/16	6-1/4
Concrete Density as Tested, SSD, pcf	144.6	147.1	146.3	146.7	145.4
Uncorrected Compressive Strength, psi	2870	3800	3430	3530	3650
Corrected Compressive Strength, psi	2800	3710	3350	3440	3560
Nominal Maximum Size of Aggregate, Inches	3/4	3/4	3/4	3/4	3/4

REMARKS: R-1 had an electrical conduit in the base of the core which was removed prior to testing.

16-1 had two pieces of #3 wire in the core which were removed prior to testing.

Top and bottom of R-1 was trimmed.

Bottom only of all other cores was trimmed.

No frost crystal imprints were evident in any of the cores.

Mr. A. L. Brown of Weidemann, Brown Inc., Dr. W. Little of Nichols, Norton & Zalastani Inc., Dr. Frank Heger of Simpson, Gumpertz & Heger Inc. and Mr. C. Terenzio of Edwards and Kelcey were present when cores were tested in compression.

THE THOMPSON & LIGHTNER CO., INC.

A. Shrestinian
A. Shrestinian

TEST OF CONCRETE CORES

BUILDING COLLAPSE
2000 COMMONWEALTH AVENUE
BRIGHTON, MASSACHUSETTS

Test Number - RR 366
Date Received - 3-15-71 Date Tested 3-17-71
Source - Sampled by T&L at project site on 3-15-71
Sample - Eight nominal 4" diameter concrete cores
marked 3-1, 7-1, 10-1, 12-1, 13-1, 14-1,
14-2, 15-2A
Test Procedure - ASTM Designation: C42-68 methods where they
apply

<u>Specimen Mark</u>	<u>3-1</u>	<u>7-1</u>	<u>10-1</u>	<u>12-1</u>
Core Dimensions, inches				
Length as Received	7-3/8	7-29/32	6-3/8	7-3/8
Diameter	3-15/16	3-15/16	3-15/16	3-15/16
Length as Trimmed	6-3/4	7-11/16	5-11/16	7-3/8
Length after Capping	6-15/16	7-13/16	5-27/32	7-5/8
Concrete Density as Tested, SSD, pcf	145.4	146.6	145.8	148.2
Uncorrected Compressive Strength, psi	3900	3630	3330	3670
Corrected Compressive Strength, psi	3830	3620	3220	3650
Nominal Maximum Size of Aggregate, Inches	3/4	3/4	3/4	3/4

Test Number - RR 366 (Continued)

<u>Specimen Mark</u>	<u>13-1</u>	<u>14-1</u>	<u>14-2</u>	<u>15-2A</u>
Core Dimensions, inches				
Length as Received	6-1/2	7-1/4	7-5/16	7-7/8
Diameter	3-15/16	3-15/16	3-15/16	3-15/16
Length as Trimmed	5-19/32	6-15/32	6-13/16	7-5/8
Length after Capping	5-3/4	6-11/16	7-1/32	7-7/8
Concrete Density as Tested, SSD, pcf	145.7	146.9	146.9	145.2
Uncorrected Compressive Strength, psi	3390	4040	4250	3330
Corrected Compressive Strength, psi	3270	3950	4180	3330
Nominal Maximum Size of Aggregate, Inches	3/4	3/4	3/4	3/4

REMARKS: Core 3-1 had a piece of #3 wire in the bottom of the core which was removed prior to testing.

Bottom of all cores except core 12-1 was trimmed. Top of all cores were left as is.

Mr. A. L. Brown of Weidemann, Brown Inc., Dr. F. Heger of Simpson, Gumpertz & Heger, Inc., and Mr. C. Terenzio of Edwards and Kelcey were present when cores were tested in compression.

THE THOMPSON & LIGHTNER CO., INC.



A. Shrestinian

TEST OF CONCRETE CORES

BUILDING COLLAPSE
2000 COMMONWEALTH AVENUE
BRIGHTON, MASSACHUSETTS

Test Number - RR 387

Date Received - 3-18-71 Date Tested 3-20-71

Source - Sampled by T&L at project site on 3-18-71

Samples - Four nominal 2-1/4" diameter concrete cores marked B-1, G-1, G-2, 16-4 and two nominal 1/4" diameter concrete cores marked R-5, R-6

Test Procedure - ASTM Designation: C42-68 methods where they apply

<u>Specimen Mark</u>	<u>B-1</u>	<u>G-1</u>	<u>G-2</u>	<u>R-5</u>	<u>R-6</u>	<u>16-4</u>
Core Dimensions, inches						
Length as Received	7-1/16	6-7/8	6-5/8	6-5/8	6-1/8	7
Diameter	2-1/4	2-1/4	2-1/4	3-15/16	3-15/16	2-1/4
Length as Trimmed	4-7/16	4-7/16	4-3/8	5-5/16	5-15/16	4-13/32
Length after Capping	4-9/16	4-9/16	4-17/32	5-1/2	6-1/8	4-9/16
Concrete Density as Tested, SSD, pcf	148.3	147.9	149.7	146.5	146.5	146.5
Uncorrected Compressive Strength, psi	4790	4480	6040	2140	2650	2780
Corrected Compressive Strength, psi	4790	4480	6040	2050	2580	2780
Nominal Maximum Size of Aggregate, Inches	3/4	3/4	3/4	3/4	3/4	3/4

There was no steel in any of the above cores.

THE THOMPSON & LIGHTNER CO., INC.

A. Shrestinian
A. Shrestinian

TABLE II.2.4a

SWISS HAMMER TEST RESULTS OBTAINEDFROM THE UNCOLLAPSED STRUCTURE (SLABS)

<u>Location</u>	<u>Date</u>	<u>Temp. °F</u>	<u>Readings Vertical Down. Schmidt Hammer</u>	<u>Aver- age</u>	<u>Cor- rected Average</u>	<u>Indicated Compressive Strength (PSI)</u>
<u>Penthouse Floor Slab</u>						
Lines "7" & "E"	3/2/71	40	18,19,17,20,15,	17.8	17.3	< 1750
Lines "8" & "E"	3/2/71	40	19,21,21,17,20,	19.6	19.1	1750
Lines "9" & "E"	3/2/71	40	27,26,31,24,29,	27.4	26.9	3000
Lines "7"- 1/2(E to F)	3/2/71	40	15,20,20,18,18,	18.2	17.7	< 1750
Lines "8"- 1/2(E to F)	3/2/71	40	25,31,24,25,25,	26.0	25.5	2700
Lines "9"- 1/2(E to F)	3/2/71	40	29,25,22,27,19,	24.4	23.9	2400
Lines "7" & "F"	3/2/71	40	20,22,24,20,19,	21.0	20.5	1800
Lines "8" & "F"	3/2/71	40	19,18,19,18,15,	17.8	17.3	< 1750
Lines "9" & "F"	3/2/71	40	25,21,21,22,21,	22.0	21.5	2000
<u>Main Roof. Slab</u>						
6 to 7, South of C Line	3/2/71	40	17,15,15,17,15,	15.8	15.3	< 1750
7 to 8, South of C Line	3/2/71	40	17,13,14,14,13,	14.2	13.7	< 1750
8 to 9, South of D Line	3/2/71	40	22,23,17,18,23,	20.6	20.1	1800

TABLE II.2.4a

SWISS HAMMER TEST RESULTS OBTAINEDFROM THE UNCOLLAPSED STRUCTURE (SLABS)

<u>Location</u>	<u>Date</u>	<u>Temp. OF</u>	<u>Readings Vertical Down. Schmidt Hammer</u>	<u>Aver- age</u>	<u>Cor- rected Average</u>	<u>Indicated Compressive Strength (PSI)</u>
9 to 10, South of D Line	3/ 2/71	40	17,22,18,21,17,	19.0	18.5	< 1750
West of 11 Line, South of D Line	3/ 2/71	40	17,17,22,21,17,	18.8	18.3	< 1750
6 to 7, D to E	3/ 2/71	40	14,14,13,15,13,	13.8	13.3	< 1750
NW-E-10	3/ 2/71	40	24,22,22,24,28,	24.0	23.5	2300
E to F West of Line 11	3/ 2/71	40	23,26,20,15,22,	21.2	20.7	1900
Sw-F-10	3/ 2/71	40	21,22,23,23,25,	22.8	22.3	2100
6 to 7- NW (F-6)	3/ 2/71	40	17,17,17,14,19,	16.8	16.3	< 1750
8 Line- 1/2(F to G)	3/ 2/71	40	20,12,14,13,15,	14.8	14.3	< 1750
8 to 9, N.G-Line	3/ 2/71	40	24,19,24,18,22,	21.4	20.9	1900
9 Line N.G-Line	3/ 2/71	40	21,25,23,23,26,	23.6	23.1	2300
10 Line N.G-Line	3/ 2/71	40	15,20,24,18,19,	19.2	18.7	< 1750
NW Cor.	3/ 2/71	40	17,16,18,18,20,	17.8	17.3	< 1750
<u>16th Floor Slab</u>						
8 to 9 D to E	2/26/71	38	28,24,23,24,30,	25.8	25.3	2700
9 to 10 D to E	2/26/71	38	26,26,28,29,26,	27.0	26.5	2900

TABLE II.2.4a

SWISS HAMMER TEST RESULTS OBTAINEDFROM THE UNCOLLAPSED STRUCTURE (SLABS)

<u>Location</u>	<u>Date</u>	<u>Temp. °F</u>	<u>Readings Vertical Down. Schmidt Hammer</u>	<u>Aver- age</u>	<u>Cor- rected Average</u>	<u>Indicated Compressive Strength (PSI)</u>
10 to 11 D to E	2/26/71	38	26,24,24,26,28,	25.6	25.1	2600
8 to 9 E to F	2/26/71	38	21,28,27,28,28,	26.4	25.9	2800
9 to 10 E to F	2/26/71	38	34,31,34,33,32,	32.8	32.3	4000
10 to 11 E to F	2/26/71	38	Not Made			Covered
8 to 9 F to G	2/26/71	38	30,30,28,30,30,	29.6	29.1	3300
9 to 10 F to G	2/26/71	38	32,31,36,31,33,	32.6	32.1	3900
10 to 11 F to G	2/26/71	38	29,31,33,30,35,	31.6	31.1	3700
<u>15th Floor Slab</u>						
8 to 9 D to E	2/22/71	34	26,27,30,27,26,	27.2	26.7	2900
9 to 10 D to E	2/22/71	34	25,22,22,25,24,	23.6	23.1	2300
10 to 11 D to E	2/22/71	34	20,24,23,23,26,	23.2	22.7	2200
8 to 9 E to F	2/22/71	34	25,31,28,27,31	28.4	27.9	3200
9 to 10 E to F	2/22/71	34	20,22,20,18,22,	20.4	19.9	1800
10 to 11 E to F	2/22/71	34	21,18,23,23,30,	23.0	22.5	2200
8 to 9 F to G	2/22/71	34	26,29,30,23,25,	26.6	26.1	2800

TABLE II.2.4a

SWISS HAMMER TEST RESULTS OBTAINEDFROM THE UNCOLLAPSED STRUCTURE (SLABS)

<u>Location</u>	<u>Date</u>	<u>Temp. OF</u>	<u>Readings Vertical Down. Schmidt Hammer</u>	<u>Aver- age</u>	<u>Cor- rected Average</u>	<u>Indicated Compressive Strength (PSI)</u>
9 to 10 F to G	2/22/71	34	22,22,26,24,30,	24.8	24.3	2500
10 to 11 F to G	2/22/71	34	28,29,30,26,24,	27.4	26.9	3000
<u>14th Floor Slab</u>						
8 to 9 D to E	2/22/71	34	29,36,28,31,31,	31.0	30.5	3600
9 to 10 D to E	2/22/71	34	28,28,29,30,31,	29.2	28.7	3300
10 to 11 D to E	2/22/71	34	29,32,27,31,28,	29.4	28.9	3300
8 to 9 E to F	2/22/71	34	24,21,21,28,29,	24.6	24.1	2500
9 to 10 E to F	2/22/71	34	32,25,28,27,31,	28.6	28.1	3200
10 to 11 E to F	2/22/71	34	33,34,38,32,36,	34.6	34.1	4400
8 to 9 F to G	2/22/71	34	31,35,31,35,35,	33.4	32.9	4100
9 to 10 F to G	2/22/71	34	32,35,34,28,35,	32.8	32.3	4000
10 to 11 F to G	2/22/71	34	32,28,26,22,34,	28.4	27.9	3200
<u>13th Floor Slab</u>						
8 to 9 D to E	3/ 1/71	38	34,31,33,34,33,	33.0	32.5	4000
9 to 10 D to E	3/ 1/71	38	32,33,33,31,33,	32.4	31.9	3900

TABLE II.2.4a

SWISS HAMMER TEST RESULTS OBTAINEDFROM THE UNCOLLAPSED STRUCTURE (SIABS)

<u>Location</u>	<u>Date</u>	<u>Temp. °F</u>	<u>Readings Vertical Down. Schmidt Hammer</u>	<u>Aver- age</u>	<u>Cor- rected Average</u>	<u>Indicated Compressive Strength (PSI)</u>
10 to 11 D to E	3/ 1/71	38	31,32,34,34,33,	32.8	32.3	4000
8 to 9 E to F	3/ 1/71	38	32,35,31,31,33,	32.4	31.9	3900
9 to 10 E to F	3/ 1/71	38	33,31,32,33,33,	32.4	31.9	3900
10 to 11 E to F	3/ 1/71	38	36,32,36,34,37,	35.0	34.9	4500
8 to 9 F to G	3/ 1/71	38	28,28,31,35,32,	30.8	30.3	3600
9 to 10 F to G	3/ 1/71	38	29,26,32,34,34,	31.0	30.5	3600
10 to 11 F to G	3/ 1/71	38	32,22,25,31,35,	29.0	28.5	3300
<u>12th Floor Slab</u>						
8 to 9 D to E	2/12/71	34	39,41,32,39,40,	38.2	37.7	5100
9 to 10 D to E	2/12/71	34	33,34,39,39,34,	35.8	35.3	4600
10 to 11 D to E	2/12/71	34	37,39,38,40,40,	38.8	38.3	5300
8 to 9 E to F	2/12/71	34	41,41,40,42,42,	41.2	40.7	5800
9 to 10 E to F	2/12/71	34	42,37,42,44,43,	41.6	41.1	5900
10 to 11 E to F	2/12/71	34	31,31,28,31,35,	31.2	30.7	3600
8 to 9 F to G	2/12/71	34	39,41,40,42,42,	40.5	40.0	5600
9 to 10 F to G	2/12/71	34	37,33,35,35,36,	35.2	34.7	4500

TABLE II.2.4a

SWISS HAMMER TEST RESULTS OBTAINEDFROM THE UNCOLLAPSED STRUCTURE (SLABS)

<u>Location</u>	<u>Date</u>	<u>Temp. OF</u>	<u>Readings Vertical Down. Schmidt Hammer</u>	<u>Aver- age</u>	<u>Cor- rected Average</u>	<u>Indicated Compressive Strength (PSI)</u>
10 to 11 F to G	2/12/71	34	40,35,36,35,39,	37.0	36.5	4900
<u>11th Floor Slab</u>						
8 to 9 D to E	3/ 1/71	40+	34,29,29,34,34,	32.0	31.5	3800
9 to 10 D to E	3/ 1/71	40+	31,31,26,33,31,	30.4	29.9	3500
10 to 11 D to E	3/ 1/71	40+	30,27,28,27,29,	28.2	27.7	3100
8 to 9 E to F	3/ 1/71	40+	27,29,28,28,30,	28.4	27.9	3200
9 to 10 E to F	3/ 1/71	40+	33,31,32,30,32,	31.6	31.1	3700
10 to 11 E to F	3/ 1/71	40+	27,29,32,26,28,	28.4	27.9	3200
8 to 9 F to G	3/ 1/71	40+	32,32,33,30,32,	31.8	31.3	3800
9 to 10 F to G	3/ 1/71	40+	26,26,24,27,31,	26.8	26.3	2900
10 to 11 F to G	3/ 1/71	40+	31,32,29,35,32,	31.8	31.3	3800
<u>10th Floor Slab</u>						
8 to 9 D to E	3/ 1/71	40	24,29,29,24,24,	26.0	25.5	2700
9 to 10 D to E	3/ 1/71	40	31,31,26,33,31,	30.4	29.9	3500
10 to 11 D to E	3/1 /71	40	24,28,28,22,22,	24.8	24.3	2500
8 to 9 E to F	3/ 1/71	40	27,29,28,28,30,	28.4	27.9	3200

TABLE II.2.4a

SWISS HAMMER TEST RESULTS OBTAINEDFROM THE UNCOLLAPSED STRUCTURE (SIAPS)

<u>Location</u>	<u>Date</u>	<u>Temp. °F</u>	<u>Readings Vertical Down. Schmidt Hammer</u>	<u>Aver- age</u>	<u>Cor- rected Average</u>	<u>Indicated Compressive Strength (PSI)</u>
9 to 10 E to F	3/ 1/71	40	27,29,32,30,32,	30.0	29.5	3400
10 to 11 E to F	3/ 1/71	40	27,27,27,26,28,	27.0	26.5	2900
8 to 9 F to G	3/ 1/71	40	32,32,33,30,32,	31.8	31.3	3800
9 to 10 F to G	3/ 1/71	40	26,26,24,27,30,	26.6	26.1	2800
10 to 11 F to G	3/ 1/71	40	31,32,29,31,32,	31.0	30.5	3600
<u>9th Floor Slab</u>						
8 to 9 D to E	3/ 1/71	40	29,25,28,31,32,	28.8	28.3	3200
9 to 10 D to E	3/ 1/71	40	27,29,30,24,25,	27.0	26.5	2900
10 to 11 D to E	3/ 1/71	40	25,29,28,25,30,	27.4	26.9	3000
8 to 9 E to F	3/ 1/71	40	30,29,28,28,30,	29.0	28.5	3300
9 to 10 E to F	3/ 1/71	40	30,28,26,29,28,	28.2	27.7	3100
10 to 11 E to F	3/ 1/71	40	28,28,29,30,31,	29.2	28.7	3300
8 to 9 F to G	3/ 1/71	40	29,29,29,33,27,	29.4	28.9	3300
9 to 10 F to G	3/ 1/71	40	29,31,28,25,25,	27.6	27.1	3000
10 to 11 F to G	3/ 1/71	40	28,29,28,28,30,	28.6	28.1	3200

TABLE II.2.4a

SWISS HANDBER TEST RESULTS OBTAINEDFROM THE UNCOLLAPSED STRUCTURE (SLABS)

<u>Location</u>	<u>Date</u>	<u>Temp. OF</u>	<u>Readings Vertical Down. Schmidt Hammer</u>	<u>Aver- age</u>	<u>Cor- rected Average</u>	<u>Indicated Compressive Strength (PSI)</u>
<u>8th Floor Slab</u>						
8 to 9 D to E	2/9/71	36	36,31,38,32,29,	33.2	32.7	4100
9 to 10 D to E	2/9/71	36	35,34,31,34,35,	33.8	33.3	4200
10 to 11 D to E	2/9/71	36	37,33,28,35,36,	33.8	33.3	4200
8 to 9 E to F	2/9/71	36	37,36,27,40,34	34.8	34.3	4400
9 to 10 E to F	2/9/71	36	31,34,28,33,31,	31.4	30.9	3700
10 to 11 E to F	2/9/71	36	34,31,28,33,33,	31.8	31.3	3800
8 to 9 F to G	2/9/71	36	36,34,26,35,36,	33.4	32.9	4100
9 to 10 F to G	2/9/71	36	34,32,30,33,31,	32.0	31.5	3800
10 to 11 F to G	2/9/71	36	39,38,38,38,35,	37.6	37.1	5100
<u>7th Floor Slab</u>						
8 to 9 D to E	2/9/71	34	33,34,28,31,33,	31.8	31.3	3800
9 to 10 D to E	2/9/71	34	32,36,34,34,38,	34.8	34.3	4400
10 to 11 D to E	2/9/71	34	32,29,34,33,36,	32.8	31.3	3800
8 to 9 E to F	2/9/71	34	29,31,36,33,29,	31.6	31.1	3700

TABLE II.2.4a . SWISS HAMMER TEST RESULTS OBTAINED
FROM THE UNCOLLAPSED STRUCTURE (SLABS)

<u>Location</u>	<u>Date</u>	<u>Temp. OF</u>	<u>Readings Vertical Down. Schmidt Hammer</u>	<u>Aver- age</u>	<u>Cor- rected Average</u>	<u>Indicated Compressive Strength (PSI)</u>
9 to 10 E to F	2/9/71	34	27,34,32,31,29,	30.6	30.1	3500
10 to 11 E to F	2/9/71	34	31,28,29,29,29,	29.2	28.7	3300
8 to 9 F to G	2/9/71	34	34,37,33,35,33,	34.4	33.9	4300
9 to 10 F to G	2/9/71	34	35,31,29,34,31,	32.0	31.5	3800
10 to 11 F to G	2/9/71	34	37,38,35,37,42,	37.8	37.3	5100
<u>6th Floor Slab</u>						
8 to 9 D to E	2/9/71	34	30,30,35,34,34,	32.6	32.1	3900
9 to 10 D to E	2/9/71	34	34,37,44,30,34,	35.8	35.3	4600
10 to 11 D to E	2/9/71	34	35,33,38,31,33,	34.0	33.5	4200
8 to 9 E to F	2/9/71	34	33,33,33,27,27,	30.6	30.1	3500
9 to 10 E to F	2/9/71	34	40,33,39,39,34,	37.0	36.5	4900
10 to 11 E to F	2/9/71	34	28,27,31,27,31,	28.8	28.3	3200
8 to 9 F to G	2/9/71	34	35,38,35,38,35,	36.2	35.7	4700
9 to 10 F to G	2/9/71	34	36,37,31,35,32,	34.2	33.7	4300
10 to 11 F to G	2/9/71	34	33,31,32,34,35,	33.0	32.5	4000

TABLE II.2.4a

SWISS HAMMER TEST RESULTS OBTAINED
FROM THE UNCOLLAPSED STRUCTURE (SLABS)

<u>Location</u>	<u>Date</u>	<u>Temp. OF</u>	<u>Readings Vertical Down. Schmidt Hammer</u>	<u>Aver- age</u>	<u>Cor- rected Average</u>	<u>Indicated Compressive Strength (PSI)</u>
<u>5th Floor Slab</u>						
8 to 9 D to E	2/25/71	38	40,42,40,39,41,	40.4	39.9	5600
9 to 10 D to E	2/25/71	38	38,38,41,45,33,	39.0	38.5	5300
10 to 11 D to E	2/25/71	38	42,40,38,38,36,	38.8	38.3	5300
8 to 9 E to F	2/25/71	38	38,37,37,36,38,	37.2	36.7	4700
9 to 10 E to F	2/25/71	38	45,44,42,42,42,	43.0	42.5	> 6000
10 to 11 E to F	2/25/71	38	43,44,42,45,42,	43.2	42.7	> 6000
8 to 9 F to G	2/25/71	38	41,38,41,44,39,	40.6	40.1	5700
9 to 10 F to G	2/25/71	38	43,42,46,43,43,	43.4	42.9	> 6000
10 to 11 F to G	2/25/71	38	34,33,33,40,42,	36.4	35.9	4800
<u>4th Floor Slab</u>						
8 to 9 D to E	2/25/71	38	26,26,28,28,32,	28.0	27.5	3100
9 to 10 D to E	2/25/71	38	32,29,32,31,29,	30.6	30.1	3500
10 to 11 D to E	2/25/71	38	28,32,32,30,29,	30.2	29.7	3400
8 to 9 E to F	2/25/71	38	27,28,29,28,30,	28.4	27.9	3200
9 to 10 E to F	2/25/71	38	32,32,29,31,33,	31.4	30.9	3700

TABLE II.2.4a

SWISS HAMMER TEST RESULTS OBTAINED
FROM THE UNCOLLAPSED STRUCTURE (SLABS)

<u>Location</u>	<u>Date</u>	<u>Temp. OF</u>	<u>Readings Vertical Down. Schmidt Hammer</u>	<u>Aver- age</u>	<u>Cor- rected Average</u>	<u>Indicated Compressive Strength (PSI)</u>
10 to 11 E to F	2/25/71	38	35,34,31,31,32,	32.6	32.0	3900
8 to 9 F to G	2/25/71	38	27,30,32,28,28,	29.0	28.5	3300
9 to 10 F to G	2/25/71	38	28,34,34,34,38,	33.6	33.1	4200
10 to 11 F to G	2/25/71	38	29,30,31,30,34,	30.8	30.3	3600
<u>3rd Floor Slab</u>						
8 to 9 D to E	2/25/71	38	28,36,32,30,30,	31.2	30.7	3600
9 to 10 D to E	2/25/71	38	33,37,31,34,37,	34.4	33.9	4300
10 to 11 D to E	2/25/71	38	34,36,39,37,36,	36.4	35.9	4800
8 to 9 E to F	2/25/71	38	36,33,30,33,30,	32.4	31.9	3900
9 to 10 E to F	2/25/71	38	33,35,37,37,33,	35.0	34.5	4500
10 to 11 E to F	2/25/71	38	28,28,29,30,29,	28.8	28.3	3200
8 to 9 F to G	2/25/71	38	27,24,31,32,36,	30.0	29.5	3400
9 to 10 F to G	2/25/71	38	31,32,30,32,30,	31.0	30.5	3600
10 to 11 F to G	2/25/71	38	35,31,31,33,38,	33.6	33.1	4200
<u>2nd Floor Slab</u>						
8 to 9 D to E	2/25/71	36	33,34,37,32,32,	33.6	33.1	4200

TABLE II.2.4a

SWISS HAMMER TEST RESULTS OBTAINED
FROM THE UNCOLLAPSED STRUCTURE (SLABS)

<u>Location</u>	<u>Date</u>	<u>Temp. °F</u>	<u>Readings Vertical Down. Schmidt Hammer</u>	<u>Aver- age</u>	<u>Cor- rected Average</u>	<u>Indicated Compressive Strength (PSI)</u>
<u>2nd Floor Slab</u>						
9 to 10 D to E	2/25/71	36	33,38,37,38,38,	36.8	36.3	4900
10 to 11 D to E	2/25/71	36	29,32,33,30,28,	30.4	29.9	3500
8 to 9 E to F	2/25/71	36	35,36,33,34,34,	34.4	33.9	4300
9 to 10 E to F	2/25/71	36	34,37,31,34,35,	34.2	33.7	4300
10 to 11 E to F	2/25/71	36	- - - - -	-	-	-
8 to 9 F to G	2/25/71	36	20,24,26,24,29,	24.6	24.1	2500
9 to 10 F to G	2/25/71	36	28,30,32,29,25,	28.8	28.3	3200
10 to 11 F to G	2/25/71	36	35,29,30,35,32,	32.2	31.7	3900

TABLE II.2.4b

SWISS HAMMER TEST RESULTS OBTAINED
FROM THE UNCOLLAPSED STRUCTURE (COLUMNS)

<u>Location</u>	<u>Date</u>	<u>Temp. °F</u>	<u>Readings Vertical Down. Schmidt Hammer</u>	<u>Aver- age</u>	<u>Cor- rected Average</u>	<u>Indicated Compressive Strength (PSI)</u>
<u>Columns 16th Floor to Roof</u>						
D-9	2/26/71	38	30,24,23,29,28,	26.8	26.3	2200
D-10	2/26/71	38	30,29,26,29,29,	28.6	28.1	2600
DX-11	2/26/71	38	31,27,25,28,26,	27.4	26.9	2400
E-8	2/26/71	38	32,32,30,30,34,	31.6	31.1	3100
E-9	2/26/71	38	26,32,23,29,29,	27.8	27.3	2400
E-10	2/26/71	38	26,26,29,28,29,	27.6	27.1	2400
E-11	2/26/71	38	26,28,25,26,22,	25.4	24.9	2000
F-8	2/26/71	38	30,28,32,29,26,	29.0	28.5	2700
F-9	2/26/71	38	30,28,22,29,30,	27.8	27.3	2400
F-10	2/26/71	38	26,28,27,27,24,	26.4	25.9	2200
F-11	2/26/71	38	24,27,29,28,32,	28.0	27.5	2500
G-9	2/26/71	38	30,29,26,32,33,	30.0	29.5	2800
G-10	2/26/71	38	22,30,28,34,27,	28.2	27.7	2500
GX-11	2/26/71	38	26,28,27,32,36,	29.8	29.3	2800
<u>Columns 15th Floor to 16th Floor</u>						
D-9	2/22/71	34	26,28,31,25,30,	28.0	27.5	2500
D-10	3/ 1/71	40	30,29,30,27,28,	28.8	28.3	2600
DX-11	2/22/71	34	26,27,25,27,27,	26.4	25.9	2200
E-8	2/22/71	34	28,28,29,26,30,	28.2	27.7	2500
E-9	2/22/71	34	29,29,29,29,24,	28.0	27.5	2500
E-10	2/22/71	34	27,21,30,26,27,	26.2	25.7	2100

TABLE II.2.4b

SWISS HAMMER TEST RESULTS OBTAINED
FROM THE UNCOLLAPSED STRUCTURE (COLUMNS)

<u>Location</u>	<u>Date</u>	<u>Temp. Of</u>	<u>Readings Vertical Down, Schmidt Hammer</u>	<u>Aver- age</u>	<u>Cor- rected Average</u>	<u>Indicated Compressive Strength (PSI)</u>
E-11	2/22/71	34	21,22,25,29,29,	25.2	24.7	2000
F-8	2/22/71	34	29,27,26,29,29,	28.0	27.5	2500
F-9	2/22/71	34	20,29,24,26,28,	25.4	24.9	2000
F-10	3/ 1/71	40	25,22,22,25,28,	24.4	23.9	1800
F-11	2/22/71	34	26,23,27,27,25,	25.6	25.1	2000
G-9	3/ 1/71	40	26,19,28,25,25,	24.6	24.1	1900
G-10	2/22/71	34	26,23,23,25,29,	25.2	24.7	2000
GX-11	2/22/71	34	30,28,26,29,30,	28.6	28.1	2600
<u>Columns 14th Floor to 15th Floor</u>						
D-9	2/22/71	34	37,26,29,29,23,	28.8	28.3	2600
D-10	2/22/71	34	30,31,30,30,29,	30.0	25.5	2100
DX-11	2/22/71	34	28,28,24,29,27,	27.2	26.7	2300
E-8	2/22/71	34	27,29,28,27,29,	28.0	27.5	2500
E-9	2/22/71	34	26,27,29,33,29,	28.8	28.3	2600
E-10	2/22/71	34	28,24,26,23,26,	25.4	24.9	2000
E-11	2/22/71	34	29,31,25,26,30,	28.2	27.7	2500
F-8	2/22/71	34	28,22,29,28,23,	26.0	25.5	2100
F-9	3/ 1/71	40	27,29,29,27,27,	27.8	27.3	2500
F-10	2/22/71	34	26,24,29,29,29,	27.4	26.5	2300
F-11	2/22/71	34	27,25,31,25,29,	27.4	26.9	2300
G-9	2/22/71	34	27,27,21,29,27,	26.2	25.7	2100
G-10	2/22/71	34	27,29,24,26,29,	27.0	26.5	2300
GX-11	2/22/71	34	26,26,25,22,28,	25.4	24.9	2000

TABLE II.2.4b

SWISS HAMMER TEST RESULTS OBTAINED
FROM THE UNCOLLAPSED STRUCTURE (COLUMNS)

<u>Location</u>	<u>Date</u>	<u>Temp. °F</u>	<u>Readings Vertical Down. Schmidt Hammer</u>	<u>Aver- age</u>	<u>Cor- rected Average</u>	<u>Indicated Compressive Strength (PSI)</u>
<u>Columns 13th Floor to 14th Floor</u>						
D-9	3/ 1/70	38	32,34,32,32,34,	32.8	32.3	3400
D-10	3/ 1/70	38	32,30,35,30,30,	31.4	30.9	3100
DX-11	3/ 1/70	38	27,31,31,35,35,	31.8	31.3	3200
E-8	3/ 1/70	38	34,36,38,34,32,	34.8	34.3	3800
E-9	3/ 1/70	38	37,38,36,38,38,	37.4	36.9	4300
E-10	3/ 1/70	38	37,36,38,35,36,	36.4	35.9	4100
E-11	3/ 1/70	38	33,28,29,29,31,	30.0	29.5	2800
F-8	3/ 1/70	38	25,32,25,25,25,	26.4	25.9	2200
F-9	3/ 1/70	38	29,18,21,30,20,	23.6	23.1	1750
F-10	3/ 1/70	38	29,26,25,29,27,	27.2	26.7	2300
F-11	3/ 1/70	38	26,29,30,30,32,	29.4	28.4	2600
G-9	3/ 1/70	38	32,24,27,31,29,	29.0	28.5	2700
G-10	3/ 1/70	38	34,26,19,28,30,	27.4	26.9	2400
GX-11	3/ 1/70	38	25,26,29,25,37,	28.4	27.9	2500
<u>Columns 12th Floor to 13th Floor</u>						
D-9	2/12/71	34	39,40,42,39,35,	39.0	38.5	4700
D-10	2/12/71	34	40,36,32,39,39,	36.0	35.5	4000
DX-11	2/12/71	34	28,37,36,38,38,	37.4	36.9	4300
E-8	2/12/71	34	40,35,36,37,39,	37.4	36.9	4300
E-9	2/12/71	34	39,37,34,38,39,	37.4	36.9	4300

TABLE II.2.4b

SWISS HAMMER TEST RESULTS OBTAINEDFROM THE UNCOLLAPSED STRUCTURE (COLUMNS)

<u>Location</u>	<u>Date</u>	<u>Temp. Of</u>	<u>Readings Vertical Down. Schmidt Hammer</u>	<u>Aver- age</u>	<u>Cor- rected Average</u>	<u>Indicated Compressive Strength (PSI)</u>
E-10	2/12/71	34	40,36,34,35,35,	36.0	35.5	4000
E-11	2/12/71	34	38,42,38,37,37,	38.4	37.9	4500
F-8	2/12/71	34	38,37,40,36,35,	36.2	35.7	4100
F-9	2/12/71	34	36,30,38,40,38,	36.4	35.9	4100
F-10	2/12/71	34	38,38,34,36,38,	36.8	36.3	4200
F-11	2/12/71	34	38,38,36,37,35,	36.8	36.0	4100
G-9	2/12/71	34	39,39,38,40,36,	38.4	37.9	4500
G-10	2/12/71	34	34,37,40,37,35,	36.6	36.1	4200
GX-11	2/12/71	34	37,33,30,34,36,	34.0	33.5	3600
<u>Columns 11th Floor to 12th Floor</u>						
D-9	2/12/71	40+	35,37,37,39,30,	35.6	35.1	4000
D-10	2/12/71	40+	36,37,37,38,38,	37.2	36.7	4300
DX-11	2/12/71	40+	38,37,34,33,36,	35.6	35.1	4000
E-8	2/12/71	40+	33,33,40,38,38,	36.4	35.9	4100
E-9	2/12/71	40+	36,38,36,40,36,	37.2	36.7	4300
E-10	2/12/71	40+	35,30,36,36,35,	34.4	33.9	3700
E-11	2/12/71	40+	33,34,38,38,36,	35.8	35.3	4000
F-8	2/12/71	40+	36,36,39,41,40,	38.4	37.9	4500
F-9	2/12/71	40+	37,32,35,35,36,	35.0	34.5	3800
F-10	2/12/71	40+	35,37,36,40,33,	36.2	35.7	4100
F-11	2/12/71	40+	34,37,32,39,31,	34.6	34.1	3700
G-9	2/12/71	40+	34,40,36,39,35,	36.8	36.3	4200

TABLE II.2.4b

SWISS HAMMER TEST RESULTS OBTAINED
FROM THE UNCOLLAPSED STRUCTURE (COLUMNS)

<u>Location</u>	<u>Date</u>	<u>Temp. °F</u>	<u>Readings Vertical Down. Schmidt Hammer</u>	<u>Average</u>	<u>Cor- rected Average</u>	<u>Indicated Compressive Strength (PSI)</u>
G-10	2/12/71	40+	38,39,37,33,31,	35.6	35.1	4000
GX-11	2/12/71	40+	33,28,34,37,35,	33.4	32.9	3500
<u>Columns 10th Floor to 11th Floor</u>						
D-9	3/1/71	40	29,27,28,27,26,	27.4	26.9	2400
D-10	3/1/71	40	29,31,25,27,27,	27.8	27.3	2400
DX-11	3/1/71	40	29,36,31,34,31,	27.8	27.3	2400
E-8	3/1/71	40	28,29,26,30,28,	28.2	27.7	2500
E-9	3/1/71	40	28,28,29,29,31,	29.0	28.5	2700
E-10	3/1/71	40	31,31,26,30,30,	29.6	29.1	2800
E-11	3/1/71	40	29,30,28,26,29,	28.4	27.9	2500
F-8	3/1/71	40	25,30,27,28,32,	28.4	27.9	2500
F-9	3/1/71	40	23,25,24,28,26,	25.2	24.7	2000
F-10	3/1/71	40	33,28,28,30,25,	28.8	28.3	2600
F-11	3/1/71	40	29,36,33,32,29,	28.2	27.7	2500
G-9	3/1/71	40	24,24,24,31,35,	27.6	27.1	2400
G-10	3/1/71	40	30,31,31,31,31,	30.8	30.3	3000
GX-11	3/1/71	40	28,29,29,29,30,	29.0	28.5	2700
<u>Columns 9th Floor to 10th Floor</u>						
D-9	2/9/71	34	25,31,30,32,32,	30.0	29.5	2800
D-10	2/9/71	34	24,32,31,33,35,	31.0	30.5	3000

TABLE II.2.4b

SWISS HAMMER TEST RESULTS OBTAINEDFROM THE UNCOLLAPSED STRUCTURE (COLUMNS)

<u>Location</u>	<u>Date</u>	<u>Temp. °F</u>	<u>Readings Vertical Down. Schmidt Hammer</u>	<u>Aver- age</u>	<u>Cor- rected Average</u>	<u>Indicated Compressive Strength (PSI)</u>
DX-11	2/9/71	34	28,30,35,27,32,	30.4	29.9	2900
E-8	2/9/71	34	26,27,31,28,30,	28.4	27.9	2500
E-9	2/9/71	34	30,30,32,30,31,	30.6	30.1	3000
E-10	2/9/71	34	30,31,36,26,27,	30.0	29.5	2800
E-11	2/9/71	34	31,32,31,29,32,	31.0	30.5	3000
F-8	2/9/71	34	29,27,27,32,34,	29.8	29.3	2800
F-9	2/9/71	34	30,30,30,27,26,	28.6	28.1	2600
F-10	2/9/71	34	32,28,30,27,27,	28.8	28.3	2600
F-11	2/9/71	34	28,33,32,30,32,	31.0	30.5	3000
G-9	2/9/71	34	30,27,29,29,32,	29.4	28.9	2700
G-10	2/9/71	34	32,35,32,27,27,	30.6	30.1	3000
GX-11	2/9/71	34	32,30,29,27,30,	29.6	29.1	2800
Columns 8th Floor to 9th Floor						
D-9	2/9/71	36	33,29,27,30,35,	30.8	30.3	3000
D	2/9/71	36	28,30,31,27,34,	30.8	30.3	3000
DX-11	2/9/71	36	26,29,32,27,32,	29.2	28.7	2700
E-8	2/9/71	36	38,40,38,28,35,	35.8	35.3	4000
E-9	2/9/71	36	38,31,42,36,31,	35.6	35.1	4000
E-10	2/9/71	36	28,32,33,38,32,	32.6	32.1	3300
E-11	2/9/71	36	35,34,38,35,35,	35.4	34.9	3900
F-8	2/9/71	36	35,31,26,34,29,	31.0	30.5	3000
F-9	2/9/71	36	31,31,28,29,33,	30.4	29.9	2900

TABLE II.2.4b

SWISS HAMMER TEST RESULTS OBTAINEDFROM THE UNCOLLAPSED STRUCTURE (COLUMNS)

<u>Location</u>	<u>Date</u>	<u>Temp. °F</u>	<u>Readings Vertical Down. Schmidt Hammer</u>	<u>Aver- age</u>	<u>Cor- rected Average</u>	<u>Indicated Compressive Strength (PSI)</u>
F-10	2/9/71	36	32,33,26,32,34,	31.4	30.9	3100
F-11	2/9/71	36	32,30,30,37,31,	32.0	31.5	3200
G-9	2/9/71	36	29,32,33,30,33,	31.4	30.9	3100
G-10	2/9/71	36	27,30,33,33,33,	31.2	30.7	3100
GX-11	2/9/71	36	32,34,34,32,36,	33.6	33.1	3500
<u>Columns 7th Floor to 8th Floor</u>						
D-9	2/9/71	34	38,40,36,34,41,	37.8	37.3	4400
D-10	2/9/71	34	40,40,36,35,35,	37.2	36.7	4300
DX-11	2/9/71	34	34,38,34,30,35,	34.2	33.7	3600
E-8	2/9/71	34	33,36,38,38,33,	35.6	35.1	4000
E-9	2/9/71	34	36,38,38,31,40,	36.6	36.1	4200
E-10	2/9/71	34	38,35,39,34,32,	35.6	35.1	4000
E-11	2/9/71	34	40,32,35,35,35,	35.4	34.9	3900
F-8	2/9/71	34	38,34,31,33,35,	34.2	33.7	3600
F-9	2/9/71	34	34,33,36,40,35,	35.6	35.1	4000
F-10	2/9/71	34	36,34,32,32,38,	34.4	33.9	3700
F-11	2/9/71	34	35,38,37,40,40,	38.0	37.5	4500
G-9	2/9/71	34	42,38,41,45,41,	41.4	40.9	5200
G-10	2/9/71	34	38,32,32,34,36,	34.4	33.9	3700
GX-11	2/9/71	34	34,34,34,34,34,	34.0	33.5	3600

TABLE II.2.4b

SWISS HAMMER TEST RESULTS OBTAINED
FROM THE UNCOLLAPSED STRUCTURE (COLUMNS)

<u>Location</u>	<u>Date</u>	<u>Temp. °F</u>	<u>Readings Vertical Down. Schmidt Hammer</u>	<u>Aver- age</u>	<u>Cor- rected Average</u>	<u>Indicated Compressive Strength (PSI)</u>
<u>Columns 6th Floor to 7th Floor</u>						
D-9	2/ 9/71	34	32,34,40,30,37,	34.6	34.1	3700
D-10	2/ 9/71	34	36,40,30,34,35,	35.0	34.5	3800
DX-11	2/ 9/71	34	34,36,32,36,38,	35.2	34.7	3900
E-8	2/ 9/71	34	36,38,36,35,32,	35.4	34.9	3900
E-9	2/ 9/71	34	32,35,37,35,38,	35.4	34.9	3900
E-10	2/ 9/71	34	36,35,33,39,36,	35.8	35.3	4000
E-11	2/ 9/71	34	37,36,35,43,34,	37.0	36.5	4300
F-8	2/ 9/71	34	32,36,35,40,39,	36.4	35.9	4100
F-9	2/ 9/71	34	33,36,31,32,35,	33.4	32.9	3500
F-10	2/ 9/71	34	39,35,35,32,30,	34.2	33.7	3600
F-11	2/ 9/71	34	38,33,38,36,37,	36.4	35.9	4100
G-9	2/ 9/71	34	30,43,32,28,31,	32.8	32.3	3400
G-10	2/ 9/71	34	34,36,31,35,28,	32.8	32.3	3400
GX-11	2/ 9/71	34	30,36,34,34,35,	33.8	33.3	3600
<u>Columns 5th Floor to 6th Floor</u>						
D-9	2/25/71	38	44,38,42,37,35,	39.2	38.7	4700
D-10	2/25/71	38	40,38,35,37,32,	36.4	35.9	4100
DX-11	2/25/71	38	36,40,46,40,40,	40.4	39.9	5000
E-8	2/25/71	38	39,36,39,40,38,	38.4	37.9	4500
E-9	2/25/71	38	40,37,46,43,41,	41.4	39.9	5000

TABLE II.2.4b

SWISS HAMMER TEST RESULTS OBTAINED

FROM THE UNCOLLAPSED STRUCTURE (COLUMNS)

<u>Location</u>	<u>Date</u>	<u>Temp. Of</u>	<u>Readings Vertical Down. Schmidt Hammer</u>	<u>Aver- age</u>	<u>Cor- rected Average</u>	<u>Indicated Compressive Strength (PSI)</u>
E-10	2/25/71	38	46,38,38,33,45,	40.0	39.5	4900
E-11	2/25/71	38	40,36,42,43,38,	39.8	39.3	4900
F-8	2/25/71	38	45,31,42,40,36,	38.8	38.3	4600
F-9	2/25/71	38	46,42,46,42,39,	43.0	42.5	> 5200
F-10	2/25/71	38	43,37,41,38,36,	39.0	38.5	4700
F-11	2/25/71	38	40,43,42,38,35,	39.6	39.1	4700
G-9	2/25/71	38	42,40,38,42,40,	40.4	39.9	5000
G-10	2/25/71	38	37,40,40,39,37,	38.6	38.1	4600
GX-11	2/25/71	38	41,35,36,40,42,	38.8	38.3	4600
<u>Columns 4th Floor to 5th Floor</u>						
D-9	2/25/71	38	38,32,36,38,38,	36.4	35.9	4100
D-10	2/25/71	38	36,37,40,41,42,	39.2	38.7	4700
DX-11	2/25/71	38	34,38,36,38,36,	36.4	35.9	4100
E-8	2/25/71	38	40,38,38,40,42,	39.6	39.1	4800
E-9	2/25/71	38	40,34,38,40,38,	38.0	37.5	4500
E-10	2/25/71	38	38,38,45,38,32,	38.2	37.7	4500
E-11	2/25/71	38	36,42,40,39,41,	39.6	39.1	4800
F-8	2/25/71	38	40,35,42,42,42,	40.2	39.7	4900
F-9	2/25/71	38	38,40,40,36,40,	38.8	38.3	4600
F-10	2/25/71	38	38,36,35,40,40,	38.2	37.7	4500
F-11	2/25/71	38	38,39,42,44,35,	39.6	39.1	4800
G-9	2/25/71	38	35,40,37,42,40,	38.8	38.3	4600

TABLE II.2.4b

SWISS HAMMER TEST RESULTS OBTAINED
FROM THE UNCOLLAPSED STRUCTURE (COLUMNS)

<u>Location</u>	<u>Date</u>	<u>Temp. °F</u>	<u>Readings Vertical Down. Schmidt Hammer</u>	<u>Aver- age</u>	<u>Cor- rected Average</u>	<u>Indicated Compressive Strength (PSI)</u>
G-10	2/25/71	38	42,40,39,38,38,	39.4	38.9	4700
GX-11	2/25/71	38	40,42,42,42,38,	40.8	40.3	5100
<u>Columns 3rd Floor to 4th Floor</u>						
D-9	2/25/71	38	Covered No Readings	-	-	-
D-10	2/25/71	38	Covered No Readings	-	-	-
DX-11	2/25/71	38	35,33,32,34,36,	34.0	33.5	3600
E-8	2/25/71	38	37,40,37,36,36,	37.2	36.7	4300
E-9	2/25/71	38	30,35,33,35,37,	34.0	33.5	3600
E-10	2/25/71	38	35,31,34,38,35,	34.6	34.1	3700
E-11	2/25/71	38	35,37,37,35,34,	35.6	35.1	4000
F-8	2/25/71	38	34,38,36,36,35,	35.8	35.3	4000
F-9	2/25/71	38	36,40,35,35,40,	37.2	36.7	4300
F-10	2/25/71	38	36,38,38,30,35,	35.4	34.9	3900
F-11	2/25/71	38	40,37,39,36,39,	38.2	37.7	4500
G-9	2/25/71	38	35,36,38,33,34,	35.2	34.7	3900
G-10	2/25/71	38	36,35,34,36,35,	35.2	34.7	3900
GX-11	2/25/71	38	40,40,36,34,35,	37.0	36.5	4300
<u>Columns 2nd Floor to 3rd Floor</u>						
D-9	2/25/71	36	Column Not Exposed	-	-	-
D-10	2/25/71	36	Column Not Exposed	-	-	-
DX-11	2/25/71	36	Column Not Exposed	-	-	-

TABLE II.2.4b

SWISS HAMMER TEST RESULTS OBTAINED
FROM THE UNCOLLAPSED STRUCTURE (COLUMNS)

<u>Location</u>	<u>Date</u>	<u>Temp. Of</u>	<u>Readings Vertical Down. Schmidt Hammer</u>	<u>Aver- age</u>	<u>Cor- rected Average</u>	<u>Indicated Compressive Strength (PSI)</u>
E-8	2/25/71	36	Column Not Exposed		-	-
E-9	2/25/71	36	Column Not Exposed		-	-
E-10	2/25/71	36	Column Not Exposed		-	-
E-11	2/25/71	36	Column Not Exposed		-	-
F-8	2/25/71	36	35,33,28,34,34,	32.8	32.3	3400
F-9	2/25/71	36	33,33,39,36,36,	35.4	34.9	3900
F-10	2/25/71	36	37,33,33,36,36,	35.0	34.5	3800
F-11	2/25/71	36	32,33,33,28,32,	31.6	31.1	3100
G-9	2/25/71	36	32,36,28,30,36,	32.4	31.9	3300
G-10	2/25/71	36	31,33,35,38,36,	34.6	34.1	3700
GX-11	2/25/71	36	33,35,25,33,33,	31.8	31.3	3000

TABLE II.2.4c

SWISS HAMMER TEST RESULTS OBTAINED
FROM THE UNCOLLAPSED STRUCTURE (CORES)

Location (See Plans)	Date	Temp. °F	Readings Vertical Down. Schmidt Hammer	Aver- age	Cor- rected Average	Indicated Compressive Strength (PSI)
Core PH-1 E-1/2-8 1/2	3/17/71	42+	26,28,28,26,28,	27.2	26.7	2900
Core PH-2 E-2/3-7	3/17/71	42+	13,21,25,19,15,	18.6	18.1	< 1750
Core R-1 F-1/2-8 1/3	3/17/71	42+	18,12,14,18,14,	15.2	14.7	< 1750
Core R-2 D-10-1/2	3/17/71	42+	18,26,13,21,16,	17.6	17.1	< 1750
Core R-3 D-1/2-7 1/4	3/17/71	42+	15,19,24,18,19,	19.0	18.5	< 1750
Core R-4 E-1/2-7 1/4	3/17/71	42+	21,11,23,19,25,	19.8	19.3	< 1750
Core R-5 E-1/2-9	3/18/71	38	19,14,14,16,12,	15.0	14.5	< 1750
Core R-6 F-3/4-10 3/4	3/18/71	38	13,22,23,16,24,	19.6	19.1	< 1750
Core 16-1 D-1/2-8 1/2	3/16/71	48	22,22,24,25,19,	22.4	21.9	2100
Core 16-2 E-3/4-8 1/2	3/16/71	48	19,20,21,24,26,	22.0	21.5	2000
Core 16-3 E-2/3-7 1/4	3/16/71	48	25,21,25,25,18,	22.8	22.3	2100
Core 16-4 Column E-8	3/18/71	38	Horizontal 25,27,27,30,26,	26.6	26.1	2200
Core 15-1 D-1/2-10 1/2	3/16/71	48+	22,22,23,18,22,	21.4	20.9	1900
Core 15-2A C-1/2-7 1/2	3/16/71	48+	14,21,23,16,18,	18.4	17.9	< 1750
Core 14-1 F-1/3-10 1/2	3/16/71	48+	30,30,30,30,32,	30.4	29.9	3500
Core 14-2 F-1/3-8 1/2	3/16/71	48+	22,30,22,28,32,	26.8	26.3	2900

TABLE II.2.4c

SWISS HAMMER TEST RESULTS OBTAINED
FROM THE UNCOLLAPSED STRUCTURE (CORES)

<u>Location</u> <u>(See Plans)</u>	<u>Date</u>	<u>Temp.</u> <u>°F</u>	<u>Readings</u> <u>Vertical Down.</u> <u>Schmidt Hammer</u>	<u>Aver-</u> <u>age</u>	<u>Cor-</u> <u>rected</u> <u>Average</u>	<u>Indicated</u> <u>Compressive</u> <u>Strength</u> <u>(PSI)</u>
Core 13-1 D-1/3-7 1/2	3/16/71	48+	34,32,32,35,28,	32.2	31.7	3900
Core 12-1 E-1/2-8 1/2	3/16/71	48+	35,32,30,33,32,	32.4	31.9	3900
Core 10-1 D-1/2-8 1/2	3/16/71	48+	30,22,26,34,31,	28.6	28.1	3200
Core 7-1 F-1/2-8 1/3	3/16/71	48+	30,30,31,27,36,	30.8	30.3	3700
Core 3-1 E-1/2-7 1/4	3/16/71	48+	27,24,23,23,20,	23.4	22.9	2200
Core G-1 Column D-8 Ground Floor	3/18/71	36	Horizontal 43,32,42,36,36,	37.8	37.3	5100
Core G-2 Column F-8 Ground Floor	3/18/71	36	Horizontal 38,36,39,35,34,	36.4	35.9	4800
Core B-1 Elevator Shaft. Basement Level B-7	3/18/71	36	Horizontal 46,45,44,46,46,	45.4	44.9	6000

TABLE II.2.4.d

SWISS HAMMER TEST RESULTS OBTAINEDFROM COLLAPSED PIECES

Location (See Appendix II.1)	Date	Temp. °F	Readings Vertical Down Schmidt Hammer	Aver- age	Cor- rected Average	Indicated Compressive Strength (PSI)
π 1						
Column C6, H6 or H7, From 7th to 8th Floor	3/ 3/71	34	20,23,25,27,22	23.4	22.9	2200
π 2						
Column E5 or F5, From 16th Floor to the Main Roof	3/ 3/71	34	23,19,18,21,20	20.2	19.7	1750
π 4						
Top surface has Charac- teristic of Roof	3/ 3/71	34	23,24,23,18,22, 21	22.3	21.8	2100
π 6						
Column Loca- tion not Identified	3/ 3/71	34	18,26,28,28,25	25.0	24.5	2500
π 9						
Near E-2 Southeast corner Main Roof Slab	3/ 3/71	34	15,13,20,19,13	16.0	15.5	< 1750
	3/19/71	36	16,17,15,17,18	16.6	16.1	< 1750
π 11						
From South- east corner Main Roof Slab. Lines Dx-2	3/ 3/71	34	21,22,22,25,14, 11,12,21,12,10	17.0	16.5	< 1750
π 15						
Main Roof Slab Area C to D, 6 to 7	3/ 3/71	34	14,14,15,20,13	15.2	14.7	< 1750
	3/19/71	36	19,22,22,18,20	20.2	19.7	1750

TABLE II.2.4.d

SWISS HAMMER TEST RESULTS OBTAINEDFROM COLLAPSED PIECES

<u>Location</u> (See Appendix II.1)	<u>Date</u>	<u>Temp.</u> <u>°F</u>	<u>Readings</u> <u>Vertical Down</u> <u>Schmidt Hammer</u>	<u>Aver-</u> <u>age</u>	<u>Cor-</u> <u>rected</u> <u>Average</u>	<u>Indicated</u> <u>Compressive</u> <u>Strength</u> <u>(PSI)</u>
<u>II 17</u>						
Column E3, E5, F3 or F5, From 6th to 8th Floor	3/ 3/71	34	24,27,22,24,21	23.6	23.1	2300
	3/19/71	36	30,26,28,31,21	29.2	28.7	3300
<u>II 18</u>						
Not Identified in Structure	3/19/71	36	25,25,29,31,27	27.4	26.9	3000
			20,28,24,26,28	25.2	24.7	2600
<u>II 19</u>						
Column E3, E4, F3 or F4 16th Floor to Main Roof	3/ 3/71	34	26,22,29,29,23	25.8	25.3	2700
	3/19/71	36	21,19,23,23,25	22.2	21.7	2000
<u>II 20</u>						
Main Roof (D to G, 3)	3/19/71	36	16,18,19,12,15	16.0	15.5	< 1750
			15,20,12,14,16, 10,12	14.1	13.6	< 1750
<u>II 21</u>						
12"x24" Column E3, E5, F3, F5 15th to 16th Floor or E4, F4 14th to 15th Floor	3/ 3/71	34	23,23,31,22,27	25.2	24.7	2600
	3/19/71	36	25,21,27,25,26	24.8	24.3	2500
<u>II 22</u>						
Column D3, D4, G3, G4, 3rd to 5th Floor	3/ 3/71	34	23,23,31,22,27	25.2	24.7	2600
			32,28,20,27,27	26.8	26.3	2900

TABLE II.2.4.d

SWISS HAMMER TEST RESULTS OBTAINED

FROM COLLAPSED PIECES

Location (See Appendix II.1)	Date	Temp. °F	Readings Vertical Down Schmidt Hammer	Aver- age	Cor- rected Average	Indicated Compressive Strength (PSI)
<i>TI</i> 26						
Column E4 or F4, From 9th to 10th Floor.	3/ 3/71	34	18,12,19,11,12	14.4	13.9	<1750
<i>TI</i> 61						
12"x24" Column Exterior 7th to 16th Floors	3/ 3/71	34	24,25,24,19,13	22.8	22.3	2100
	3/19/71	36	25,25,25,28,28	26.2	25.7	2800
<i>TI</i> 65						
Southeast corner Balcony Slab. 12th Floor Near Lines 2-D	3/ 3/71	34	29,20,16,28,25	23.6	23.1	2300
	3/19/71	36	29,29,29,30,29	29.2	28.7	3300
<i>TI</i> 66						
Southeast corner Balcony Slab - 11th Floor Near Lines 2-D	3/ 3/71	34	25,29,26,31,25	27.2	26.7	2900
	3/19/71	36	28,26,27,28,29	27.6	27.1	3000
<i>TI</i> 70						
Typical Floor Slab 3rd to 16th	3/19/71	36	29,28,24,31,31	28.5	28.0	3200
			16,12,16,26,28	19.6	19.1	1750
<i>TI</i> 71						
16th Floor Slab	3/ 3/71	34	19,21,29,27,21	23.4	22.9	2100
	3/19/71	36	23,24,25,24,27	24.6	24.1	2500
<i>TI</i> 71A						
16th Floor Slab	3/19/71	36	25,25,25,30,25	26.0	25.5	2700

TABLE II.2.4.d

SWISS HAMMER TEST RESULTS OBTAINEDFROM COLLAPSED PIECES

Location (See Appendix II.1)	Date	Temp. Of	Readings Vertical Down Schmidt Hammer	Aver- age	Cor- rected Average	Indicated Compressive Strength (PSI)
<u>77 78</u>						
Typical Floor Slab - 3rd to 16th	3/ 3/71	34	32,25,34,30,30	30.2	29.7	3400
	3/19/71	36	30,30,28,27,23	27.6	27.1	3000
<u>77 80</u>						
Column - Loca- tion Not Iden- tified	3/19/71	36	33,30,27,23,27	28.0	27.5	3100
			21,23,30,30,16	24.0	23.5	2300
<u>77 83</u>						
Typical Floor Slab 3rd to 16th	3/ 3/71	34	26,27,24,29,31	27.4	26.9	3000
	3/19/71	36	29,35,32,36,36	33.6	33.1	4200
<u>77 85</u>						
1/2 Cubic Yard Blob of Green Concrete with a few #6 bars and other assorted things	3/ 3/71	34	16,23,21,24,20	20.8	20.3	1800
<u>77 88</u>						
Location Not Identified	3/ 3/71	34	30,28,33,29,31	30.2	29.7	3400
	3/19/71	36	30,24,26,31,30	28.2	27.7	3100

TABLE II.2.4.e

SWISS HAMMER TEST RESULTS OBTAINED

FROM COLLAPSED PIECES (CORE AREAS)

Location (See Appendix II.1)	Date	Temp. °F.	Readings Vertical Down Schmidt Hammer	Aver- age	Cor- rected Average	Indicated Compressive Strength (PSI)
Core $\pi 9-1$						
Main Roof Slab Southeast corner Noar E-2	3/23/71	38	16,17,19,20,16	17.6	17.1	<1750
Core $\pi 9-2$						
Main Roof Slab Southeast corner Near E-2	3/23/71	38	20,17,17,14,19	17.4	16.9	<1750
Core $\pi 11-1$						
Main Roof Slab Southeast corner DX-2	3/23/71	38	25,20,20,24,26	23.0	22.5	2000
Core $\pi 11-2$						
Main Roof Slab Southeast corner DX-2	3/23/71	38	17,22,23,19,20	20.2	19.7	1750
Core $\pi 15-1$						
Main Roof Slab (C to D,) (6 to 7)	3/23/71	38	20,23,26,22,24	23.0	22.5	2000
Core $\pi 20-1$						
Main Roof Slab (D to C, 3)	3/23/71	38	16,20,20,17,17	18.0	17.5	<1750
Core $\pi 20-2$						
Main Roof Slab (D to C, 3)	3/23/71	38	21,21,21,21,16	20.0	19.5	1750
Core $\pi 20-3$						
Main Roof Slab (D to C, 3)	3/23/71	38	15,18,16,17,15	16.2	15.7	<1750

TABLE II.2.5

COMPRESSIVE STRENGTH TEST RESULTSFOR CORES TAKEN FROM COLLAPSED PIECES

<u>Location</u> (See Appendix II.1)	<u>Core Diam- eter</u>	<u>Date Sampled</u>	<u>Date Tested</u>	<u>Lab. Identi- fication</u>	<u>f_c (PSI)</u>	<u>Comments & Do- sign Strength at 28 Days (PSI)</u>
π 9				RR-226		
Main roof slab near E-2 South- east corner	4"	2/ 6/71	2/ 8/71	-3A	2100	3000
	4"	2/ 6/71	2/ 8/71	-3B	1920	3000
	4"	2/ 6/71	2/ 8/71	-3C	2090	3000
				RR-410		
	4"	3/23/71	3/25/71	-9-1	2760	3000
	4"	3/23/71	3/31/71	-9-2	2660	3000
						Autoclave Test
π 11				RR-410		
Main roof slab near DX-2 South- east corner	4"	3/23/71	3/25/71	-11-1	2310	3000
	4"	3/23/71	3/25/71	-11-2	2970	Badly cracked 3000
						Includes steel in tested por- tion of core
π 15				RR-225		
Main roof slab C to D, 6 to 7.	4"	2/ 6/71	2/ 8/71	-A	1880	3000
	2"	2/ 6/71	2/ 8/71	-C	2390	Cracked 3000
	2"	2/ 6/71	2/ 8/71	-D	2840	3000
	2"	2/ 6/71	2/ 8/71	-G	2390	3000
				RR-410		
	4"	3/23/71	3/25/71	-15	2300	3000 Cracked
π 17				RR-226		
Column E3, E5, F3 or F5, from 6th to 8th Floor	4"	2/ 6/71	2/ 8/71	-2A	3690	4000
	4"	2/ 6/71	2/ 8/71	-2B	2870	4000

TABLE II.2.5

COMPRESSIVE STRENGTH TEST RESULTSFOR CORES TAKEN FROM COLLAPSED PIECES

<u>Location</u> (See Appendix II.1)	<u>Core Diam-</u> <u>eter</u>	<u>Date</u> <u>Sampled</u>	<u>Date</u> <u>Tested</u>	<u>Lab.</u> <u>Identi-</u> <u>fication</u>	<u>f'c</u> <u>(PSI)</u>	<u>Comments & De-</u> <u>sign Strength</u> <u>at 28 Days (PSI)</u>
π 18				RR-228		
Not identified in structure	4"	2/ 7/71	2/ 9/71	-5A	4290	Includes steel in tested por- tion of core
	4"	2/ 7/71	2/ 9/71	-5B	3770	Includes steel in tested por- tion of core
	4"	2/ 7/71	2/ 9/71	-5C	3980	
	4"	2/ 7/71	2/ 9/71	-5D	4590	Includes steel in tested portion of core
π 19				RR-245		
Column E3, E4, F3 or F4 16th Floor to Main Roof	4"	2/10/71	2/12/71	-4A	3110	3000
	4"	2/10/71	2/12/71	-4B	2910	3000 Contained 1 piece of #4 Steel - center of core down 2-1/4" from top
π 20				RR-227		
Main Roof near D to C and 3 Lines	3-15/16"	2/ 7/71	2/ 9/71	-4A	1370	3000
	3-15/16"	2/ 7/71	2/ 9/71	-4B	1570	3000
	3-15/16"	2/ 7/71	2/ 9/71	-4C	1330	3000 Cracked
				RR-410		
	4"	3/23/71	3/25/71	-20-1	2360	3000
	4"	3/23/71	3/25/71	-20-2	1750	3000 Cracked
	4"	3/23/71	3/25/71	-20-3	2050	3000 Cracked

TABLE II.2.5

COMPRESSIVE STRENGTH TEST RESULTSFOR CORES TAKEN FROM COLLAPSED PIECES

<u>Location</u> (See Appendix II.1)	<u>Core</u> <u>Diam-</u> <u>eter</u>	<u>Date</u> <u>Sampled</u>	<u>Date</u> <u>Tested</u>	<u>Lab.</u> <u>Identi-</u> <u>fication</u>	<u>f'c</u> <u>(PSI)</u>	<u>Comments & De-</u> <u>sign Strength</u> <u>at 28 Days (PSI)</u>
π 21				RR-229		
12"x24" Column E3, E5, F3 or F5 15th to 16th Floor, or E4 or F4 14th to 16th Floor	4"	2/ 7/71	2/ 9/71	-6A	2200	3000
	4"	2/ 7/71	2/ 9/71	-6B	3760	3000
π 22				RR-229		
Column D3, D4, G3 or G4 3rd to 5th Floors	4"	2/ 7/71	2/ 9/71	-7A	6200	5000
	4"	2/ 7/71	2/ 9/71	-7B	5750	Contains steel 5000
π 61				RR-246		
12"x24" Column Exterior 7th to 16th Floor	4"	2/10/71	2/12/71	-5A	2980	3000 or 4000
	4"	2/10/71	2/12/71	-5B	2960	3000 or 4000
π 65				RR-243		
Southeast corner Balcony Slab 12th Floor near Lines 2-D	4"	2/10/71	2/12/71	-2A	4120	1/8" to 1/4" deep crack at Bottom - cutout when trimmed 3000
	4"	2/10/71	2/12/71	-2B	4120	 3000
π 70				RR-242		
Typical Floor Slab 3rd to 16th Floor	4"	2/10/71	2/12/71	-1A	3370	3000 or 4000
	4"	2/10/71	2/12/71	-1B	3490	3000 or 4000

TABLE II.2.5

COMPRESSIVE STRENGTH TEST RESULTSFOR CORES TAKEN FROM COLLAPSED PIECES

<u>Location</u> (See Appendix II.1)	<u>Core</u> <u>Diam-</u> <u>eter</u>	<u>Date</u> <u>Sampled</u>	<u>Date</u> <u>Tested</u>	<u>Lab.</u> <u>Identi-</u> <u>fication</u>	<u>f'_c</u> <u>(PSI)</u>	<u>Comments & De-</u> <u>sign Strength</u> <u>at 28 Days (PSI)</u>
π 71				RR-244		
16th Floor Slab	4"	2/10/71	2/12/71	-3A	2960	3000 Contained steel, crack 4-3/4" long at center of core running length- wise from bottom
	4"	2/10/71	2/12/71	-3B	3170	3000 Crack 3" long at center of core running length- wise from bottom
	4"	2/10/71	2/12/71	-3C	3450	3000
	4"	2/10/71	2/12/71	-3D	3350	3000 Contained steel, crack 2" long at center of core running length- wise from bottom
	4"	2/10/71	2/12/71	-3E	3400	3000 Crack at bottom eliminated in trimming
π 80				RR-261		
Column loca- tion not identified	4"	2/12/71	2/17/71	-2A	3820	
	4"	2/12/71	2/17/71	-2B	3700	
π 83				RR-260		
Typical Floor Slab 3rd to 16th Floor	4"	2/12/71	2/18/71	-1A	2930	3000 or 4000
	4"	2/12/71	2/18/71	-1B	3060	3000 or 4000
	4"	2/12/71	2/18/71	-1C	3700	3000 or 4000 One piece of #4 rested on edge of core 7-1/4" from top. Cut off in trimming

TABLE II.2.5

COMPRESSIVE STRENGTH TEST RESULTSFOR CORES TAKEN FROM COLLAPSED PIECES

<u>Location</u> (See Appendix II.1)	<u>Core</u> <u>Diam-</u> <u>eter</u>	<u>Date</u> <u>Sampled</u>	<u>Date</u> <u>Tested</u>	<u>Lab.</u> <u>Identi-</u> <u>fication</u>	<u>f'c</u> <u>(PSI)</u>	<u>Comments & De-</u> <u>sign Strength</u> <u>at 28 Days (PSI)</u>
π 88				RR-262		
Location not identified	4"	2/12/71	2/17/71	-3A	4780	Contained one #4 rod from top. Removed in trimming
	4"	2/12/71	2/17/71	-3C1	4350	Contained same steel as 3A. Steel included in tested core
	4"	2/12/71	2/17/71	-3C2	3500	Contained same steel as 3A. Steel included in tested core
1-29-#7 Not identi- fied				RR-206		
	4"	2/ 1/71	2/ 3/71	-1	3790	
1-29-#3 Not identi- fied				RR-206		
	4"	2/ 1/71	2/ 3/71	-2A	4870	
	4"	2/1/71	2/ 3/71	-2B	5170	
1-29#5				RR-206		
Not identi- fied	4"	2/ 1/71	2/ 3/71	-3A	2860	
	4"	2/ 1/71	2/ 3/71	-3B	2920	
1-30-#1				RR-206		
Not identi- fied	4"	2/ 1/71	2/ 3/71	-4A	3430	
	4"	2/ 1/71	2/ 3/71	-4B	3430	

Reports of Tests: RR-206, RR-225, RR-226, RR-227, RR-228, RR-229,
 RR-242, RR-243, RR-244, RR-245, RR-246, RR-260,
 RR-261, RR-262 and RR-410 follow:

TEST OF CONCRETE CORES

BUILDING COLLAPSE
 2000 COMMONWEALTH AVENUE
BRIGHTON, MASSACHUSETTS

Test Number - RR 206

Date Received - 2-1-71 Date Tested 2-3-71

Source - Sampled by T&L at site of building collapse on 2-1-71

Sample - Seven nominal 4" diameter concrete cores cut from concrete pieces at job site marked 1, 2A, 2B, 3A, 3B, 4A, 4B

Test Procedure - ASTM Designation: C42-68 methods where they apply

<u>Specimen Mark</u>	<u>1</u>	<u>2A</u>	<u>2B</u>	<u>3A</u>
Core Dimensions, inches				
Length as Received	7	11-1/4	8-1/2	9
Diameter	3-15/16	3-15/16	3-15/16	3-15/16
Length as Trimmed	4-3/8	7-21/32	7-21/32	7-5/8
Length after Capping	4-5/8	7-7/8	7-7/8	7-13/16
Concrete Density as Tested, SSD, pcf	145.9	147.8	147.4	146.3
Uncorrected Compressive Strength, psi	4070	4870	5170	2860
Corrected Compressive Strength, psi	3790	4870	5170	2860
Nominal Maximum Size of Aggregate, Inches	3/4	3/4	3/4	3/4

Test Number - RR 206 (Continued)

<u>Specimen Mark</u>	<u>3B</u>	<u>1A</u>	<u>1B</u>
Core Dimensions, inches			
Length as Received	10-1/4	8-7/8	8-7/8
Diameter	3-15/16	3-15/16	3-15/16
Length as Trimmed	7-5/8	7-21/32	6-1/32
Length after Capping	7-13/16	7-7/8	6-1/4
Concrete Density as Tested, SSD, pcf	146.8	147.8	147.7
Uncorrected Compressive Strength, psi	2920	3430	3530
Corrected Compressive Strength, psi	2920	3430	3430
Nominal Maximum Size of Aggregate, Inches	3/4	3/4	3/4

THE THOMPSON & LIGHTNER CO., INC.

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TEST OF CONCRETE CORES

BUILDING COLLAPSE
2000 COMMONWEALTH AVENUE
BRIGHTON, MASSACHUSETTS

Test Number - RR 225

Date Received - 2-6-71 Date Tested 2-8-71

Date Sampled - 2-6-71

Source - Sampled by T&L at Building Collapse Site

Samples - Two nominal 4" diameter and three nominal 2" diameter concrete cores and two pieces of concrete cut from fallen roof slab identified as T 15 marked as follows:

- A, 4" core
- B, 4" core
- C, 2" core (2 pieces)
- D, 2" core (2 pieces)
- E, Chunk of concrete
- F, Chunk of concrete
- G, 2" core

Test Procedure - ASTM Designation: C42-68 methods where they apply for cores.
Cubes cut from Samples E & F, capped and tested in compression.

<u>Specimen Mark</u>	<u>A</u>	<u>C</u>	<u>D</u>	<u>G</u>
Core Dimensions, inches				
Length as Received	8-1/8	6-1/2	2	4
Diameter	3-15/16	1-3/4	1-3/4	1-3/4
Length as Trimmed	5-1/4	3-1/16	1-23/32	3-5/16
Length after Capping	5-5/16	3-5/32	1-27/32	3-15/32
Concrete Density as Tested, SSD, pcf	145.9	148.9	148.2	148.4
Uncorrected Compressive Strength, psi	1970	2430	3100	2390
Corrected Compressive Strength, psi	1880	2390	2840	2390
Nominal Maximum Size of Aggregate, Inches	3/4	3/4	3/4	3/4

Test Number - RR 225 (Continued)

<u>Sample Mark</u>	<u>E1</u>	<u>E2</u>	<u>F1</u>	<u>F2</u>	<u>F3</u>
Cube Size, Inches	2-1/2	2-3/8	3	3	3
Concrete Density as Tested, SSD, pcf	146.7	148.0	147.7	145.3	146.4
Compressive Strength, PSI	3180	3240	2310	2080	1990

REMARKS: Core B was too short, thus not suitable for testing.

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TEST OF CONCRETE CORES

BUILDING COLLAPSE
2000 COMMONWEALTH AVENUE
BRIGHTON, MASSACHUSETTS

Test Number - RR 226

Date Received - 2-6-71 Date Tested 2-8-71

Date Sampled - 2-6-71

Source - Sampled by T&L at Building Collapse Site

Sample - Five nominal 4" diameter concrete cores cut from concrete identified as follows:

- Marked 2A, from column identified as π 17
- Marked 2B, from column identified as π 17
- Marked 3A, from slab identified as π 9
- Marked 3B, from slab identified as π 9
- Marked 3C, from slab identified as π 9

Test Procedure - ASTM Designation: C42-63 methods where they apply

<u>Specimen Mark</u>	<u>2A</u>	<u>2B</u>	<u>3A</u>	<u>3B</u>	<u>3C</u>
Core Dimensions, inches					
Length as Received	9-1/4	8-3/4	6-1/2	6	7-7/8
Diameter	3-15/16	3-15/16	3-15/16	3-15/16	3-15/16
Length as Trimmed	7-5/8	7-21/32	5-1/16	4-31/32	7-21/32
Length after Capping	7-25/32	7-13/16	5-3/16	5-5/32	7-13/16
Concrete Density as Tested, SSD, pcf	146.8	146.5	146.9	146.4	146.9
Uncorrected Compressive Strength, psi	3700	2870	2220	2030	2090
Corrected Compressive Strength, psi	3690	2870	2100	1920	2090
Nominal Maximum Size of Aggregate, Inches	3/4	3/4	3/4	3/4	3/4

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TEST OF CONCRETE CORES

BUILDING COLLAPSE
2000 COMMONWEALTH AVENUE
BRIGHTON, MASSACHUSETTS

Test Number - RR 227

Date Received - 2-7-71 Date Tested 2-9-71

Date Sampled - 2-7-71

Source - Sampled by T&L at Building Collapse Site

Sample - Three nominal 3-15/16" diameter concrete cores cut from concrete slab identified as W 20 and marked as follows:

- Marked 4A
- Marked 4B
- Marked 4C

Test Procedure - ASTM Designation: C42-68 methods where they apply

<u>Specimen Mark</u>	<u>4A</u>	<u>4B</u>	<u>4C*</u>
Core Dimensions, inches			
Length as Received	7-3/4	5-1/2	7-3/4
Diameter	3-15/16	3-15/16	3-15/16
Length as Trimmed	6-15/32	4-9/16	4-9/16
Length after Capping	6-21/32	4-25/32	6-15/32
Concrete Density as Tested, SSD, pcf	149.4	147.3	146.3
Uncorrected Compressive Strength, psi	1400	1680	1360
Corrected Compressive Strength, psi	1370	1570	1330
Nominal Maximum Size of Aggregate, Inches	3/4	3/4	3/4

* Cracked

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TEST OF CONCRETE CORES

BUILDING COLLAPSE
2000 COMMONWEALTH AVENUE
BRIGHTON, MASSACHUSETTS

Test Number - RR 228

Date Received - 2-7-71 Date Tested 2-9-71

Date Sampled - 2-7-71

Source - Sampled by T&L at Building Collapse Site

Sample - Four nominal 4" diameter concrete cores cut from concrete slab identified as π 18 and marked as follows:

- Marked 5A
- Marked 5B
- Marked 5C
- Marked 5D

Test Procedure - ASTM Designation: C42-68 methods where they apply

<u>Specimen Mark</u>	<u>5A *</u>	<u>5B *</u>	<u>5C</u>	<u>5D *</u>
Core Dimensions, inches				
Length as Received	8	8-1/8	7-3/4	8
Diameter	3-15/16	3-15/16	3-15/16	3-15/16
Length as Trimmed	7-21/32	7-21/32	7-21/32	5-9/16
Length after Capping	7-27/32	7-25/32	7-7/8	5-23/32
Concrete Density as Tested, SSD, pcf	151.5	153.2	148.4	152.3
Uncorrected Compressive Strength, psi	4290	3780	3980	4760
Corrected Compressive Strength, psi	4290	3770	3980	4590
Nominal Maximum Size of Aggregate, Inches	3/4	3/4	3/4	3/4

REMARKS: * Includes steel in tested portion of core.

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TEST OF CONCRETE CORES

BUILDING COLLAPSE
2000 COMMONWEALTH AVENUE
BRIGHTON, MASSACHUSETTS

Test Number - RR 229

Date Received - 2-7-71 Date Tested 2-9-71

Date Sampled - 2-7-71

Source - Sampled by T&L at Building Collapse Site

Sample - Four nominal 4" diameter concrete cores cut from concrete columns identified as follows:

- Marked 6A, Column identified as π 21
- Marked 6B, Column identified as π 21
- Marked 7A, Column identified as π 22
- Marked 7B, Column identified as π 22

Test Procedure - ASTM Designation: C42-68 methods where they apply

<u>Specimen Mark</u>	<u>6A</u>	<u>6B</u>	<u>7A*</u>	<u>7B</u>
Core Dimensions, inches				
Length as Received	8-3/4	9	9-3/4	9-1/8
Diameter	3-15/16	3-15/16	3-15/16	3-15/16
Length as Trimmed	7-21/32	7-21/32	7-5/8	7-21/32
Length after Capping	7-13/16	7-27/32	7-3/4	7-7/8
Concrete Density as Tested, SSD, pcf	147.6	147.3	148.0	147.6
Uncorrected Compressive Strength, psi	2200	3760	6220	5750
Corrected Compressive Strength, psi	2200	3760	6200	5750
Nominal Maximum Size of Aggregate, Inches	3/4	3/4	3/4	3/4
* Contains Steel.				

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TEST OF CONCRETE CORES

BUILDING COLLAPSE
2000 COMMONWEALTH AVENUE
BRIGHTON, MASSACHUSETTS

Test Number - RR 242

Date Received - 2-10-71 Date Tested 2-12-71

Date Sampled - 2-10-71

Source - Sampled by T&L at Building Collapse Site

Samples - Two nominal 4" diameter cores identified as 1A and 1B taken from slab marked T70, probably end of building at stairs 14-15 floor.

Test Procedure - ASTM Designation: C42-68 methods where they apply

<u>Specimen Mark</u>	<u>1A</u>	<u>1B</u>
Core Dimensions, inches		
Length as Received	8-7/8	8-3/4
Diameter	3-15/16	3-15/16
Length as Trimmed	7-5/8	7-5/8
Length after Capping	7-13/16	7-13/16
Concrete Density as Tested, SSD, pcf	148.2	147.7
Uncorrected Compressive Strength, psi	3370	3490
Corrected Compressive Strength, psi	3370	3490
Nominal Maximum Size of Aggregate, Inches	3/4	3/4

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TEST OF CONCRETE CORES

BUILDING COLIAPSE
2000 COMMONWEALTH AVENUE
BRIGHTON, MASSACHUSETTS

Test Number - RR 243
Date Received - 2-10-71 Date Tested 2-12-71
Date Sampled - 2-10-71
Source - Sampled by T&L at Building Collapse Site
Sample - Two nominal 4" diameter cores identified as follows:
- 2A - Slab marked π 65
- 2B - Porch Corner?, 15-16 Floor
Test Procedure - ASTM Designation: C42-68 methods where they apply

<u>Specimen Mark</u>	<u>2A</u>	<u>2B</u>
Core Dimensions, inches		
Length as Received	6	6
Diameter	3-15/16	3-15/16
Length as Trimmed	5-11/16	5-11/16
Length after Capping	5-29/32	5-7/8
Concrete Density as Tested, SSD, pcf	147.3	147.5
Uncorrected Compressive Strength, psi	4250	4250
Corrected Compressive Strength, psi	4120	4120
Nominal Maximum Size of Aggregate, Inches	3/4	3/4

REMARKS: Core 2A had 1/8 to 1/4" deep crack at bottom. This cut out when trimmed.

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TEST OF CONCRETE CORES

BUILDING COLLAPSE
2000 COMMONWEALTH AVENUE
BRIGHTON, MASSACHUSETTS

Test Number - RR 244
Date Received - 2-10-71 Date Tested 2-12-71
Date Sampled - 2-10-71
Source - Sampled by T&L at Building Collapse Site
Sample - Five nominal 4" diameter cores as 3A, 3B, 3C, 3D, 3E. Slab, 16th floor, probably back edge, 3-5 lines, marked π 71
Test Procedure - ASTM Designation: C42-68 methods where they apply

<u>Specimen Mark</u>	<u>3A</u>	<u>3B</u>	<u>3C</u>	<u>3D</u>	<u>3E</u>
Core Dimensions, inches					
Length as Received	8-1/8	6	8-1/8	8	5-1/2
Diameter	3-15/16	3-15/16	3-15/16	3-15/16	3-15/16
Length as Trimmed	7-5/8	5-9/16	7-5/8	7-5/8	4-3/16
Length after Capping	7-13/16	5-11/16	7-13/16	7-13/16	4-3/8
Concrete Density as Tested, SSD, pcf	148.3	147.2	146.6	150.0	147.0
Uncorrected Compressive Strength, psi	2960	3310	3450	3350	3700
Corrected Compressive Strength, psi	2960	3170	3450	3350	3400
Nominal Maximum Size of Aggregate, Inches	3/4	3/4	3/4	3/4	3/4

REMARKS: 3A - contained steel, crack 4-3/4" long at center of core running lengthwise from bottom
B - crack 3" long at center of core running lengthwise from bottom
D - contained steel, crack 2" long at center of core running lengthwise from bottom
E - crack at bottom eliminated in trimming

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TEST OF CONCRETE CORES

BUILDING COLLAPSE
2000 COMMONWEALTH AVENUE
BRIGHTON, MASSACHUSETTS

Test Number - RR 245
Date Received - 2-10-71 Date Tested 2-12-71
Date Sampled - 2-10-71
Source - Sampled by T&L at Building Collapse Site
Sample - Two nominal 4" diameter cores identified as 4A, 4B, marked T 19, Col. 12"x24", 6 - #6 bars
Test Procedure - ASTM Designation: C42-68 methods where they apply

<u>Specimen Mark</u>	<u>4A</u>	<u>4B</u>
Core Dimensions, inches		
Length as Received	7-7/8	8
Diameter	3-15/16	3-15/16
Length as Trimmed	7-9/32	7-5/16
Length after Capping	7-7/16	7-1/2
Concrete Density as Tested, SSD, pcf	147.1	148.6
Uncorrected Compressive Strength, psi	3140	2940
Corrected Compressive Strength, psi	3110	2910
Nominal Maximum Size of Aggregate, Inches	3/4	3/4

REMARKS: 4B contained steel 1 piece #4. Center of core down 2-1/4" from top.

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TEST OF CONCRETE CORES

BUILDING COLLAPSE
2000 COMMONWEALTH AVENUE
BRIGHTON, MASSACHUSETTS

Test Number - RR 246
Date Received - 2-10-71 Date Tested 2-12-71
Date Sampled - 2-10-71
Source - Sampled by T&L at Building Collapse Site
Sample - Two nominal 4" diameter cores identified as 5A, 5B, marked π 61, Col. 12"x24", 6 - #6 bars
Test Procedure - ASTM Designation: C42-68 methods where they apply

<u>Specimen Mark</u>	<u>5A</u>	<u>5B</u>
Core Dimensions, inches		
Length as Received	7-3/4	8
Diameter	3-15/16	3-15/16
Length as Trimmed	7-17/32	7-5/8
Length after Capping	7-23/32	7-13/16
Concrete Density as Tested, SSD, pcf	146.8	147.7
Uncorrected Compressive Strength, psi	2980	2960
Corrected Compressive Strength, psi	2980	2960
Nominal Maximum Size of Aggregate, Inches	3/4	3/4

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TEST OF CONCRETE CORES

BUILDING COLLAPSE
2000 COMMONWEALTH AVENUE
BRIGHTON, MASSACHUSETTS

Test Number - RR 260
Date Received - 2-12-71 Date Tested 2-18-71
Date Sampled - 2-12-71
Source - Sampled by T&L at Building Collapse Site
Sample - Three nominal 4" diameter cores identified as 1A, 1B, 1C, taken from 9" slab, 16th floor, identified as π 83
Test Procedure - ASTM Designation: C42-68 methods where they apply

<u>Specimen Mark</u>	<u>1A</u>	<u>1B</u>	<u>1C*</u>
Core Dimensions, inches			
Length as Received	7	7	9-1/16
Diameter	3-15/16	3-15/16	3-15/16
Length as Trimmed	6-1/16	6-7/32	7-1/16
Length after Capping	6-5/16	6-1/2	7-5/16
Concrete Density as Tested, SSD, pcf	144.9	145.6	145.9
Uncorrected Compressive Strength, psi	3020	3120	3740
Corrected Compressive Strength, psi	2930	3060	3700
Nominal Maximum Size of Aggregate, Inches	3/4	3/4	3/4

REMARKS: * One piece of #4 re-steel on edge of core 7-1/4" from top cut off in trimming.

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TEST OF CONCRETE CORES

BUILDING COLLAPSE
2000 COMMONWEALTH AVENUE
BRIGHTON, MASSACHUSETTS

Test Number - RR 261
Date Received - 2-12-71 Date Tested 2-17-71
Date Sampled - 2-12-71
Source - Sampled by T&L at Building Collapse Site
Sample - Two nominal 4" diameter cores identified as 2A, 2B, taken from 12"x24" column. 6-M-10-N re bars. Identified as π 80
Test Procedure - ASTM Designation: C42-68 methods where they apply

<u>Specimen Mark</u>	<u>2A</u>	<u>2B</u>
Core Dimensions, inches		
Length as Received	9	9
Diameter	3-15/16	3-15/16
Length as Trimmed	7-5/8	7-5/8
Length after Capping	7-7/8	7-7/8
Concrete Density as Tested, SSD, pcf	147.0	146.5
Uncorrected Compressive Strength, psi	3820	3700
Corrected Compressive Strength, psi	3820	3700
Nominal Maximum Size of Aggregate, Inches	3/4	3/4

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TEST OF CONCRETE CORES

BUILDING COLLAPSE
2000 COMMONWEALTH AVENUE
BRIGHTON, MASSACHUSETTS

Test Number - RR 262
Date Received - 2-12-71 Date Tested 2-17-71
Date Sampled - 2-12-71
Source - Sampled by T&L at Building Collapse Site
Sample - Four nominal 4" diameter cores identified as 3A, 3B, 3C-1, 3C-2 taken from beam identified as π 88
Test Procedure - ASTM Designation: C42-68 methods where they apply

<u>Specimen Mark</u>	<u>3A</u>	<u>3B</u>	<u>3C-1</u>	<u>3C-2</u>
Core Dimensions, inches				
Length as Received	12	No	5-1/2	8
Diameter	3-15/16	Test.-	3-15/16	3-15/16
Length as Trimmed	7-5/8	Concrete	5	5-13/16
Length after Capping	7-7/8	Section too small	5-1/4	6-1/16
Concrete Density as Tested, SSD, pcf	145.4		148.4	145.0
Uncorrected Compressive Strength, psi	4780		4580	3610
Corrected Compressive Strength, psi	4780		4350	3500
Nominal Maximum Size of Aggregate, Inches	3/4		3/4	3/4

REMARKS: Core 3A contained one #4 rod 2-1/4" from top. Removed in trimming
Core 3C-1, 3C-2 contained same steel as 3A. Steel included in tested core.
Core 3B contained metal imbedded along one side 1/32"x3/4"x9-3/4" in length. Concrete section too small for testing.

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TEST OF CONCRETE CORES

BUILDING COLLAPSE
2000 COMMONWEALTH AVENUE
BRIGHTON, MASSACHUSETTS

Test Number - RR 410

Date Received - 3-23-71 Date Tested - 3-25-71 (except π 9-2)
 π 9-2 tested 3-31-71

Date Sampled - 3-23-71

Source - Sampled by T&L at project site

Samples - Eight nominal 4" diameter concrete cores
cut from concrete slabs identified as π 9-1,
 π 9-2, π 11-1, π 11-2, π 15, π 20-1,
 π 20-2, π 20-3

Test Procedure - ASTM Designation: C42-68 methods where they
apply

<u>Specimen Mark</u>	<u>π 9-1</u>	<u>π 9-2</u>	<u>π 11-1</u>	<u>π 11-2</u>
Core Dimensions, inches				
Length as Received	7-15/16	7-3/4	8	6
Diameter	3-31/32	3-31/32	3-31/32	3-31/32
Length as Trimmed	6-7/16	6-1/4	5-5/8	5-1/16
Length after Capping	6-11/16	6-1/2	5-31/32	5-5/16
Concrete Density as Tested, SSD, pcf	146.6	146.9	147.6	156.3
Uncorrected Compressive Strength, psi	2830	2730	2380	3130
Corrected Compressive Strength, psi	2760	2660	2310	2970
Nominal Maximum Size of Aggregate, Inches	3/4	3/4	3/4	3/4

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Test Number - RR 410 (Continued)

<u>Specimen Mark</u>	<u>$\pi 15$</u>	<u>$\pi 20-1$</u>	<u>$\pi 20-2$</u>	<u>$\pi 20-3$</u>
Core Dimensions, inches				
Length as Received	9	5-1/4 to 8	7-7/8	7-3/4
Diameter	3-31/32	3-31/32	3-31/32	3-31/32
Length as Trimmed	7-1/4	5-1/4	5-15/16	6-3/8
Length after Capping	7-17/32	5-1/2	6-1/4	6-5/8
Concrete Density as Tested, SSD, pcf	145.8	146.8	145.8	146.8
Uncorrected Compressive Strength, psi	2320	2470	1800	2100
Corrected Compressive Strength, psi	2300	2360	1750	2050
Nominal Maximum Size of Aggregate, Inches	3/4	3/4	3/4	3/4

REMARKS: Dr. Frank Heger, Dr. William Little and Mr. Charles Terenzio were present during the testing of all cores except core $\pi 9-2$. Dr. Frank Heger and Mr. Terenzio were present during the testing of core $\pi 9-2$.

Core $\pi 9-2$ was placed in autoclave on 3-30-71 at a steam pressure of 150 psi, temperature range of 290° - 310°F for 5 hours. This does not include time to bring pressure up to 150 psi and down to 0. Core was tested 3-31-71.

Core $\pi 11-1$ - Badly cracked.

Core $\pi 11-2$ - Includes steel in tested portion of core.

Cores $\pi 15$, $\pi 20-2$, $\pi 20-3$ cracked.

Core $\pi 20-1$ - Top has hairline crack at surface only, otherwise sound appearance.

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TABLE II.2.6

COMPRESSIVE STRENGTH TEST RESULTS
FOR CUBES TAKEN FROM COLLAPSED PIECES

<u>Location</u>	<u>Cube Size</u>	<u>Date Sampled</u>	<u>Date Tested</u>	<u>Lab. Identification</u>	<u>f'c (PSI)</u>	<u>Comments & Design Strength at 28 Days (PSI)</u>
π 15				RR-225		
Main Roof Slab C to D, 6 to 7	2-1/2"	2/6/71	2/8/71	-E-1	3180	3000
	2-3/8"	2/6/71	2/8/71	-E-2	3240	3000
				RR-225		
	3"	2/6/71	2/8/71	-F-1	2310	3000
	3"	2/6/71	2/8/71	-F-2	2080	3000
	3"	2/6/71	2/8/71	-F-3	1990	3000
1-29-#3				RR-206 Supplement		
Not Identified in Structure	2-3/8"	2/1/71	2/3/71	-2C-1	6870	
	2-3/8"	2/1/71	2/3/71	-2C-2	7800	
	2-3/8"	2/1/71	2/3/71	-2C-3	7150	
1-29-#7				RR-192		
Not Identified in Structure	2-3/4"	2/1/71	2/1/71	-A	4830	
	2-1/4"	2/1/71	2/1/71	-B	5330	
	1-7/8"	2/1/71	2/1/71	-C	4540	
	2-3/8"	2/1/71	2/3/71	-D	6470	
	2-3/8"	2/1/71	2/3/71	-E	5960	
	2-3/8"	2/1/71	2/3/71	-F	5580	
1-29-#7				RR-206 Supplement		
	2-3/8"	2/1/71	2/3/71	-1A	5440	
	2-3/8"	2/1/71	2/3/71	-1B	5480	

TABLE II.2.6

COMPRESSIVE STRENGTH TEST RESULTSFOR CUBES TAKEN FROM COLLAPSED PIECES

<u>Location</u>	<u>Cube Size</u>	<u>Date Sampled</u>	<u>Date Tested</u>	<u>Lab. Identification</u>	<u>f'c (PSI)</u>	<u>Comments & Design Strength at 28 Days (PSI)</u>
RR-250						
Not Identified in Structure	*	2/11/71	2/17/71	-A	3260	100 lb. piece of concrete found beside Boiler on Ground level Dimension approximately 20"x12"x9"
	3--3/8"	2/11/71	2/17/71	-B	3690	
	**	2/11/71	2/17/71	-C	3650	
RR-273						
Not Identified in Structure	***	2/15/71	3/10/71	-A	5030	One chunk of concrete approximately 100 lbs. containing pieces of wood steel, plastic foam Insulation
	***	2/15/71	3/10/71	-B	5470	
	***	2/15/71	3/10/71	-C	4490	

* 3-13/32x3-3/8x3-3/8

** 3-7/32 x3-9/32x3-1/4

*** SQ. PRISMS - 3"x3"x6"

Reports of Tests RR-192, RR-206 SUPPLEMENT,

RR-225, RR-250 and RR-273 follow:

TESTS OF CONCRETE

BUILDING COLLAPSE
2000 COMMONWEALTH AVENUE
BRIGHTON, MASSACHUSETTS

Test Number - RR 192

Date Received - 2-1-71 Dates Tested 2-1-71 & 2-3-71

Source - Sampled by T&L at site of Building Collapse on 2-1-71

Sample - One piece of concrete from building approximately 6"x9"x9" marked 1B. See February 1, 1971 report by M. J. Christian. Piece was taken from specimen 1-29-#7. Probably a column section. Six cubes of varying sizes were cut from the piece of concrete. Three were tested same day as received. The remaining three cubes were placed in lime saturated water for a 40 hr. minimum period and then were tested. All cubes were capped before testing.

Results - The following data have been obtained:

<u>Specimen Mark</u>	<u>Date Tested</u>	<u>Cube Size Inches</u>	<u>Unit Weight SSD, PCF</u>	<u>Compressive Strength, PSI</u>
A	2-1-71	2-3/4	-	4830
B	"	2-1/4	-	5330
C	"	1-7/8	-	4540
D	2-3-71	2-3/8	147.7	6470
E	"	2-3/8	148.8	5960
F	"	2-3/8	148.4	5580

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TESTS OF CONCRETE

BUILDING COLLAPSE
2000 COMMONWEALTH AVENUE
BRIGHTON, MASSACHUSETTS

Test Number - RR 206 (Supplement)

Date Received - 2-1-71 Date Tested 2-3-71

Source - Sampled by T&L at site of building collapse on 2-1-71

Sample - Two pieces of concrete identified as follows:
 - #1, approximately 4-1/2"x8"x8"
 - #2C, approximately 4-1/2"x5"x9"

Test Procedure - Two 2-3/8" cubes were cut out of piece #1 and three 2-3/8" cubes were cut out of piece #2C. Cubes were placed in lime saturated water for minimum of 40 hrs, then capped and tested in compression.

Results - The following data have been obtained:

<u>Specimen Mark</u>	<u>Cube Size, Inches</u>	<u>Unit Weight SSD, PCF</u>	<u>Compressive Strength, PSI</u>
1A	2-3/8"	148.5	5440
1B	2-3/8"	148.3	5480
2C-1	2-3/8"	150.9	6870
2C-2	2-3/8"	151.5	7800
2C-3	2-3/8"	151.2	7150

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TEST OF CONCRETE CORES

BUILDING COLLAPSE
2000 COMMONWEALTH AVENUE
BRIGHTON, MASSACHUSETTS

Test Number - RR 225

Date Received - 2-6-71 Date Tested 2-8-71

Date Sampled - 2-6-71

Source - Sampled by T&L at Building Collapse Site

Samples - Two nominal 4" diameter and three nominal 2" diameter concrete cores and two pieces of concrete cut from fallen roof slab identified as N 15 marked as follows:

- A, 4" core
- B, 4" core
- C, 2" core (2 pieces)
- D, 2" core (2 pieces)
- E, Chunk of concrete
- F, Chunk of concrete
- G, 2" core

Test Procedure - ASTM Designation: C42-68 methods where they apply for cores.
Cubes cut from Samples E & F, capped and tested in compression.

<u>Specimen Mark</u>	<u>A</u>	<u>C</u>	<u>D</u>	<u>G</u>
Core Dimensions, inches				
Length as Received	8-1/8	6-1/2	2	4
Diameter	3-15/16	1-3/4	1-3/4	1-3/4
Length as Trimmed	5-1/4	3-1/16	1-23/32	3-5/16
Length after Capping	5-5/16	3-5/32	1-27/32	3-15/32
Concrete Density as Tested, SSD, pcf	145.9	148.9	148.2	148.4
Uncorrected Compressive Strength, psi	1970	2430	3100	2390
Corrected Compressive Strength, psi	1880	2390	2840	2390
Nominal Maximum Size of Aggregate, Inches	3/4	3/4	3/4	3/4

Test Number - RR 225 (Continued)

<u>Sample Mark</u>	<u>E1</u>	<u>E2</u>	<u>F1</u>	<u>F2</u>	<u>F3</u>
Cube Size, Inches	2-1/2	2-3/8	3	3	3
Concrete Donsity as Tested, SSD, pcf	146.7	148.0	147.7	145.3	146.4
Compressive Strength, PSI	3180	3240	2310	2080	1990

REMARKS: Core B was too short, thus not suitable for testing.

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BUILDING COLLAPSE
2000 COMMONWEALTH AVENUE
BRIGHTON, MASSACHUSETTS

Test Number - RR 250

Date Received - 2-11-71 Date Tested - 2-17-71

Source - Sampled by T&L at Building Collapse Site

Sample -- Approximately 100 lb. piece of concrete found beside boiler on ground level, fresh frozen concrete on top. Dimensions approximately 20"x12"x9". Reinforcing steel in specimen - one #4 bar 1-1/4" from top, another #4 bar 5-1/2" from top.

Test Procedure - Compression tests of cubes sawed from specimen

Results - The following data have been obtained:

<u>Sample Mark</u>	<u>A</u>	<u>B</u>	<u>C</u>
Cube size, inches	3-13/32x3-3/8 x3-3/8	3-3/8x3-3/8 x3-3/8	3-7/32x3-9/32 x3-1/4
Concrete density as tested, SSD, PCF	147.8	145.9	146.6
Compressive Strength, psi	3260	3690	3650

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TESTS OF CONCRETE

BUILDING COLLAPSE
2000 COMMONWEALTH AVENUE
BRIGHTON, MASSACHUSETTS

Test Number - RR 273

Date Received - 2-15-71 Date Tested 3-10-71

Source - Sampled from project site by T&L on 2-15-71

Sample - One chunk of concrete approximately 100 lbs. containing pieces of wood, steel, plastic foam insulation

Test Procedure - Three 3"x3"x6" square prisms were cut from the chunk of concrete, placed in saturated lime water for a minimum 40 hrs, ends capped and tested in compression

Results - The following data have been obtained:

<u>Specimen Mark</u>	<u>A</u>	<u>B</u>	<u>C</u>
Square Prism Size, Inches	3x3x6	3x3x6	3x3x6
Unit Weight, SSD Condition, PCF	148.8	150.2	149.1
Compressive Strength, PSI	5030	5470	4490
Aggregate Size, Inches	3/4	3/4	3/4

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TABLE II.2.7

CEMENT CONTENT TEST RESULTS FOR CORES

<u>Core Number</u>	<u>Test Number</u>	<u>Specified f'c (PSI)</u>	<u>Cement Content as per Deliveries Lbs. Per C.Y.</u>	<u>Cement Content as per Test Results Lb/CY</u>	<u>Comments</u>
Roof Slab R-1	RR-363 C	3000	540	514	Placed on 12/3/70
Roof Slab R-2	RR-363 D	3000	540	537	Placed on 12/3/70
Roof Slab R-3	RR-363 E	3000	540	596	Placed on 12/3/70
Roof Slab R-4	RR-363 F	3000	540	556	Placed on 12/3/70
Roof Slab R-5	RR-387 F	3000	540	512	Placed on 12/3/70
Roof Slab R-6	RR-387 E	3000	540	493	Placed on 12/3/70
Roof Slab π 9-3C	 RR-226 E	3000	540	506	Placed on 12/9/70
Roof Slab π 9-1	 RR-410 π 9-1	3000	540	490	Placed on 12/9/70
Roof Slab π 11-1	 RR-410 π 11-1	3000	540	492	Placed on 12/9/70
Roof Slab π 20 4A	 RR-410 π 20 4A	3000	540	488	Placed on 12/9/70
Roof Slab π 20-1	 RR-410 π 20-1	3000	540	530	Placed on 12/9/70
16th Floor Slab 16-1	RR-363 G	3000	540	573	Placed on 11/18/70
14th Floor Slab 14-2	RR-366 14-2	3000	540	565	Placed on 10/29/70 or 10/30/70

TABLE II.2.7

CEMENT CONTENT TEST RESULTS FOR CORES

<u>Core Number</u>	<u>Test Number</u>	<u>Specified f'c (PSI)</u>	<u>Cement Content as per Deliveries Lbs. Per C.Y.</u>	<u>Cement Content as per Tests Results Lb/CY</u>	<u>Comments</u>
10th Floor Slab 10-1	RR-366 10-1	3000	540	546	Placed on 9/29/70
3rd Floor Slab 3-1	3-1	4000	580	547	Placed on 8/6/70 or 8/7/70

Test Reports follow:

BREAKDOWN ANALYSES OF CONCRETE CORES

BUILDING COLLAPSE
2000 COMMONWEALTH AVENUE
BRIGHTON, MASSACHUSETTS

Test Numbers	- As noted below							
Source	- Sampled by T&L at site of Building Collapse on various dates							
Core Number	- R-2	R-3	R-4	R-5	R-6	π9-1	π11-1	π20-1
Test Numbers	- RR 363 D	RR 363 E	RR 363 F	RR 387 F	RR 387 E	RR 410 A	RR 410 C	RR 410 F
Proportions-								
<u>% by Weight</u>								
Cement *	14.6	15.9	15.2	13.8	13.3	13.2	13.2	14.3
Sand (sub #4)	46.1	47.9	42.4	40.5	42.5	40.8	44.3	41.1
Gravel (plus #4)	39.3	36.2	42.4	45.7	44.2	46.0	42.5	44.6
Weights per C.Y., <u>Pounds</u>								
Cement	537	596	556	512	493	490	492	530
Sand	1700	1800	1550	1500	1580	1510	1650	1520
Gravel	1450	1360	1550	1690	1640	1710	1590	1650
Gradation, Re- claimed Aggre- ** <u>gates, % Passing</u>								
<u>Gravel-Plus #4 Portion</u>								
1"	100			100	100	100		100
3/4"	96	100	100	96	97	94	100	92
1/2	63	70	68	46	69	67	58	49
3/8	37	44	39	28	33	33	36	28
# 4	0	0	0	0	0	0	0	0
F.M.	6.67	6.56	6.61	6.76	6.70	6.73	6.64	6.80

Continued

Core Number	- R-2	R-3	R-4	R-5	R-6	W 9-1	W 11-1	W 20-1
Test Numbers	- RR 363 D	RR 363 E	RR 363 F	RR 387 F	RR 387 E	RR 410 A	RR 410 C	RR 410 F
Sand-Sub #4 Portion								
# 4	100	100	100	100	100	100	100	100
8	79	79	80	81	81	79	78	77
16	58	57	58	61	60	59	57	55
30	39	38	39	42	41	40	40	37
50	18	19	20	28	23	21	21	19
100	3	3	4	6	7	4	5	3
F.M.	3.03	3.04	2.99	2.88	2.88	2.97	2.99	3.09

* See Attached Test Procedure.

** ASTM Methods Where They Apply.

THE THOMPSON & LIGHTNER CO., INC.

A. Shrestinian
A. Shrestinian

G.E. Jacobs
G.E. Jacobs

BREAKDOWN ANALYSES OF CONCRETE CORES

BUILDING COLLAPSE
2000 COMMONWEALTH AVENUE
BRIGHTON, MASSACHUSETTS

Test Numbers	- As noted below						
Source	- Sampled by T&L at site of Building Collapse on various dates						
Core Number	- T 9 3C	T 20 4A	R-1	16-1	3-1	10-1	14-2
Test Numbers	- RR 226 E	RR 227 A	RR 363 C	RR 363 G	RR 366 3-1	RR 366 10-1	RR 366 14-2
Proportions -							
<u>% By Weight</u>							
Cement *	13.8	13.3	14.1	15.2	15.2	14.6	15.2
Sand (sub #4)	43.9	45.1	42.9	46.6	45.0	47.8	42.4
Gravel (plus #4)	42.2	41.6	43.0	38.2	39.8	37.6	42.4
<u>Weights per C.Y., Pounds</u>							
Cement	506	488	514	573	547	546	565
Sand	1610	1650	1560	1760	1620	1790	1580
Gravel	1550	1530	1570	1440	1430	1410	1580
Gradation, Reclaimed Aggregates, % ** <u>Passing</u>							
<u>Gravel-Plus #4 Portion</u>							
1"							100
3/4	100	100	100	100	100	100	92
1/2	59	61	57	67	68	82	75
3/8	37	37	30	39	47	50	34
# 4	0	0	0	0	0	0	0
F.M.	6.63	6.63	6.70	6.61	6.53	6.50	6.74

Continued

Core Number	- N 9 3C	N 20 4A	R-1	16-1	3-1	10-1	14-2
Test Numbers	- RR 226 E	RR 227 A	RR 363 C	RR 363 G	RR 366 3-1	RR 366 10-1	RR 366 14-2

Sand-Sub #4 Portion

# 4	100	100	100	100	100	100	100
8	78	76	78	78	78	76	78
16	59	55	57	56	56	56	57
30	41	36	37	37	38	39	38
50	22	18	17	18	18	21	20
100	5	3	2	4	4	5	5
F.M.	2.95	3.12	3.09	3.07	3.06	3.03	3.02

* See Attached Test Procedure.

** ASTM Methods Where They Apply.

THE THOMPSON & LIGHTNER CO., INC.

*A. Shrestinian*A. Shrestinian*G. E. Jacobs*G. E. Jacobs

TEST PROCEDURE

FOR

* CHEMICAL BREAKDOWN OF CONCRETE

The following is a description of the method used by the laboratory to analyse concrete specimens for the cement content of the same.

A representative sample of the concrete is pulverized to a suitable fineness and dried at a temperature of 110 deg. C. A weighed sample is decomposed by hot hydrochloric acid 1:3 then after water washing, with a hot solution of sodium hydroxide, 4%. After filtering, the filtrate contains all the silica (SiO_2) and lime (CaO) from the cement, and each is determined by the standard methods of chemical analysis. The percentage of cement is calculated from each of these, and the lower figure taken as final percent of cement in the concrete. The computations are based on the average composition of Portland cement which contains 21.75% SiO_2 and 63.0% of CaO . The reliability of this procedure is controlled by analysing standard concrete samples of certified composition using the same technique.

The recovery of aggregate from concrete is made by taking a representative sample and knocking off as much cement as possible from the stone mechanically. Treatment with hot dilute acids is then used to completely clean the aggregate which is washed, dried and subjected to screen gradation analysis.

THE THOMPSON & LIGHTNER CO., INC.

G. E. Jacobs
G. E. Jacobs

TABLE II.2.8

COMPRESSIVE STRENGTH TEST RESULTSFOR CYLINDERS FOUND AT THE SITE

<u>Date Made</u>	<u>Lab. Mark</u>	<u>Test Number</u>	<u>Age Days</u>	<u>Compressive Strength (PSI)</u>	<u>Design Requirements (PSI)</u>
12/ 3/70	V-280	1	69	2630	3000 Roof
12/ 3/70	V-280	2	69	3700	3000 Roof
11/24/70	V-302	1	78	2940	3000 Lower Basement
11/24/70	V-302	2	78	3130	3000 Lower Basement
11/24/70	V-302	3	78	3170	3000 Lower Basement

Report of Test of Concrete, V-280 and V-302 follows:

FOR _____ FILE NO. _____

DATE 2-10-71

Description - ☒ Standard compression ☐ Flexural test of concrete

INVESTIGATION OF BUILDING COLLAPSE

Date received 1-26-71

Date made 12- 3-70 by others

Date tested 2-10-71

Materials: _____

C
FA
CA
Admix.

Air Temp: °F

Mix " °F

Storage - Job then Lab. damp 70°F

Slump

Load

W/C Ratio

Entrained Air

Mix

C
FA
CA
Admix.

CY

Plant Transit:- J. H. McNamara

Design Requirements

psi @ 28 days

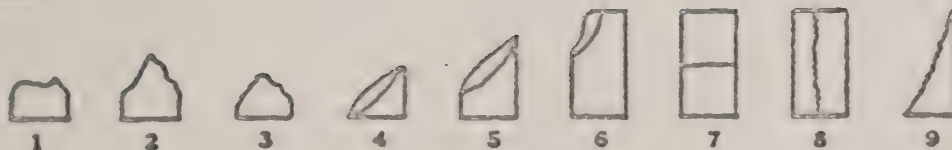
Lab.	Test No.	Job No.	Dimensions	Type of Break	Wt. per cu. ft.	Age Days	Lbs. per sq. inch
280	= 1.	S-1	6x11-3/4	3	142.5	69	2630
	= 2.	S-2	6x11-15/16	3	145.5	69	3700
	3.						
	4.						
	5.						
	6.						

Remarks:

Source

Condition of specimen

Type of break



Strength

THE THOMPSON & LIGHTNER CO., INC.

H. Christian

ENGINEERS

RESEARCH LABORATORY

8 ALTON PLACE

BROOKLINE, MASS.

FOR _____

FILE NO. _____

DATE 2-10-71Description - ☒ Standard compression ☐ Flexural test of concrete

INVESTIGATION OF BUILDING COLLAPSE

Date received 1-27-71

Air Temp: °F

Mix " °F

Storage - Job then Lab, damp 70°F

Date made 11-24-70 by others

Slump

Load

Date tested 2-10-71

W/C Ratio

Materials: _____

Entrained Air

C

FA

CA

Admix.

3/4" gravel

Mix

C

FA

CA

Admix.

CY

Plant Transit:- J. H. McNamaraDesign Requirements 3000 psi @ 28 days

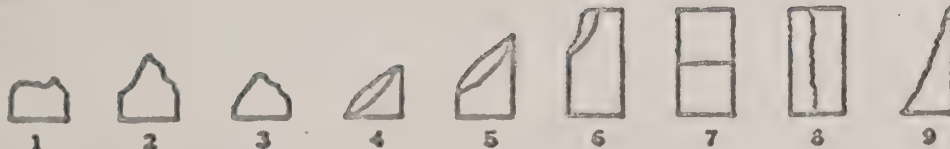
Lab.	Test No.	Job No.	Dimensions	Type of Break	Wt. per cu. ft.	Age Days	Lbs. per sq. inch
V 302	- 1.		6x12	3	146.5	78	2940
	- 2.		6x11-15/16	3	149.5	78	3130
	- 3.		6x12	3	147.5	78	3170
	4.						
	5.						
	6.						

Remarks:

Source

Condition of specimen

Type of break



Strength

THE THOMPSON & LIGHTNER CO., INC.

TABLE II.2.9a

CHLORIDE ANALYSIS OF CONCRETE FROM CORESUNCOLLAPSED STRUCTURE

<u>Core Number</u>	<u>Test Number</u>	<u>Location</u>	<u>Chlorides as CaCl₂ % of Cement</u>
R-1	RR-363 R-1	Roof Slab	0.45
R-2	RR-363 R-2	Roof Slab	NIL
R-3	RR-363 R-3	Roof Slab	NIL
R-4	RR-363 R-4	Roof Slab	0.16
R-5	RR-387 R-5	Roof Slab	NIL
R-6	RR-387 R-6	Roof Slab	NIL
16-1	RR-363 16-1	16th Floor Slab	NIL
14-2	RR-366 14-2	14th Floor Slab	NIL
10-1	RR-366 10-1	10th Floor Slab	NIL
3-1	RR-366 3-1	3rd Floor Slab	NIL

TABLE II.2.9b

CHLORIDE ANALYSIS OF CONCRETE FROM CORESCOLLAPSED PIECES

<u>Core Number</u>	<u>Test Number</u>	<u>Location</u>	<u>Chlorides as CaCl₂ % of Cement</u>
π 9-3C	RR-226 3C	Roof Slab	NIL
π 9-1	RR-410 π 9-1	Roof Slab	NIL
π 11-1	RR-410 π 11-1	Roof Slab	NIL
π 20-1	RR-410 π 20-1	Roof Slab	0.19
π 20-4A	RR-227 4A	Roof Slab	NIL

Test Report Follows:

CHLORIDE ANALYSIS OF CONCRETE

BUILDING COLLAPSE
2000 COMMONWEALTH AVENUE
BRIGHTON, MASSACHUSETTS

Test Number - As designated
Sample - 15 broken cores (4 inches) designated as below
Test Procedure - Standard methods of inorganic analysis
Results - The following data have been obtained:

<u>Sample</u>	<u>Chlorides as CaCl₂ % of Cement</u>
RR-226 3C	nil
RR-227 4A	nil
RR-363 R-1	0.45
RR-363 16-1	nil
RR-366 3-1	nil
RR-366 10-1	nil
RR-366 14-2	nil
RR-363 R-2	nil
RR-363 R-3	nil
RR-363 R-4	0.16
RR-387 R-6	nil
RR-387 R-5	nil
RR-410 π 9-1	nil
RR-410 π 11-1	nil
RR-410 π 20-1	0.19

THE THOMPSON & LIGHTNER CO., INC.

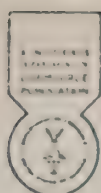
G. E. Jacobs
G. E. Jacobs

TABLE II.2.10

U. S. WEATHER BUREAU RECORDS,

LOGAN AIRPORT, BOSTON, MASSACHUSETTS

DECEMBER 1, 1969 TO MARCH 31, 1971



LOCAL CLIMATOLOGICAL DATA

U.S. DEPARTMENT OF COMMERCE

MAURICE H. STANS, Secretary

ENVIRONMENTAL SCIENCE SERVICES ADMINISTRATION

ENVIRONMENTAL DATA SERVICE

BOSTON, MASSACHUSETTS
LOGAN INTERNATIONAL AIRPORT
DECEMBER 1969

Latitude 42° 22' N				Longitude 71° 02' W				Elevation (ground) 15 ft.				Standard time used: EASTERN													
Temperature (°F)								Weather types shown by code 1-9 on dates of occurrence				Precipitation		Avg. station pressure (In.)		Wind		Sunshine		Sky cover (Tenths)		Date			
Maximum		Minimum		Average		Degree days (Base 65°)		Fog Heavy Fog		Snow, sleet or ice on ground (In.)		Water equivalent (In.)		Snow, sleet (In.)		Fastest mile		Hours and tenths		Percent of possible					
1	2	3	4	5	6	7A	7B	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22			
1	37	32	35	-5	30	30	0	1	8	0	0	0.04	0.3	29.49	34	2.4	12.5	26	N	0.0	0	10	10	1	
2	35	25	30	-9	14	35	0	0	0	0	0	0	0	29.53	31	19.1	20.4	26	NW	8.5	92	1	6	2	
3	44	29	37	-1	24	28	0	0	0	0	0	0	0	29.39	24	6.5	9.2	23	NW	5.2	58	9	6	3	
4	34	26	30	-8	16	35	0	0	0	0	0	0	0	29.56	31	12.5	13.2	23	NW	7.6	83	3	5	4	
5	36	24	30	-7	15	35	0	0	0	0	0	0	0	29.90	32	14.9	15.1	22	N	8.9	97	1	3	5	
6	36	22	29	-8	11	36	0	0	0	0	0	0	0	30.07	31	15.6	15.7	25	NW	9.0	98	0	0	6	
7	38	23	32	-4	18	33	0	0	0	0	0	0	0	30.24	31	2.6	5.8	13	NW	7.1	77	6	6	7	
8	48	35	42	6	38	23	0	1	4	0	0	1.33	0	30.20	09	12.7	13.5	21	E	0.0	0	10	10	8	
9	55	44	50	14	45	15	0	2	0	0	0	0.21	0	30.06	30	3.9	9.1	17	S	0.0	0	10	10	9	
10	46	43	45	10	39	20	0	1	0	0	0	0.44	0	30.13	03	6.0	8.3	23	E	0.0	0	10	10	10	
11	50*	44	52	17	47	13	0	2	0	0	0	0.76	0	29.57	19	14.5	22.0	34	S	0.9	10	9	7	11	
12	50	40	45	11	31	20	0	0	0	0	0	0	0	29.85	25	14.0	15.4	24	NW	7.1	77	1	4	12	
13	43	33	38	4	23	27	0	0	0	0	0	0	0	29.94	31	9.0	9.5	16	NW	3.7	40	5	5	13	
14	41	30	36	2	26	29	0	1	0	0	0	0.39	1.8	29.76	07	7.0	11.7	28	E	3.1	34	7	6	14	
15	34	28	31	-2	28	34	0	1	0	2	0	0.15	1.6	29.65	34	12.1	14.1	24	NE	0.0	0	10	10	15	
16	32	23	28	-5	19	37	0	1	0	0	0	0	0	29.94	31	14.7	14.8	18	NW	9.1	100	8	4	16	
17	31	22	27	-6	17	38	0	1	0	0	0	0	0	30.14	32	9.8	10.1	13	NW	2.8	30	9	7	17	
18	32	19	26	-6	19	39	0	1	0	0	0	0.02	0	30.17	28	2.8	5.9	12	N	4.2	46	8	8	18	
19	36	30	33	1	26	32	0	1	0	0	0	0.19	2.1	29.65	27	10.1	13.2	26	NW	2.7	29	7	6	19	
20	33	25	29	-3	19	36	0	2	0	2	0	0	0	29.75	29	17.5	18.4	25	NW	5.5	61	6	2	20	
21	36	23	30	-1	18	35	0	1	0	1	0	0	0	29.99	25	9.2	11.7	19	NW	7.3	81	3	6	21	
22	39	33	36	5	33	29	0	1	0	1	0	1.31	0	29.43	35	9.9	12.4	30	NW	0.0	0	10	10	22	
23	34	18	26	-5	9	39	0	0	0	0	0	0	0	29.76	32	12.7	13.1	28	NW	5.7	62	6	6	23	
24	23	15	19	-11	12	46	0	0	0	0	0	0.04	0.3	30.07	36	16.3	16.5	25	N	1.1	12	8	6	24	
25	27	12*	20	-10	9	45	0	0	0	0	0	0	0.1	30.33	36	8.8	10.2	15	NE	7.9	87	5	6	25	
26	44	25	35	5	34	30	0	2	4	3	0	3.51	4.1	29.69	05	16.5	19.6	38	NE	0.0	0	10	10	26	
27	49	31	40	10	35	25	0	2	4	3	0	1.03	0	28.97	29	6.5	17.3	26	E	0.0	0	10	10	27	
28	35	29	32	2	22	33	0	1	4	0	0	0.05	0	29.44	31	21.5	21.7	29	NW	5.4	59	5	6	28	
29	39	27	33	3	18	32	0	0	0	0	0	0	0	29.81	29	13.3	18.6	31	NW	9.1	100	0	2	29	
30	40	33	37	7	18	28	0	0	0	0	0	0	0	29.90	29	6.4	7.9	14	NW	0.0	0	10	10	30	
31	37	20	29	-1	24	36	0	4	0	0	0	0.28	2.3	29.74	35	9.9	12.9	20	NW	0.0	0	10	7	31	
Sum 1204		Sum 865		Total 973		Total 0		Number of days		9.74		Total 12.6		29.81		31		7.4		13.5		28		Total 121.9 for 207	
Avg. 38.8		Avg. 27.9		Avg. 33.4		Dep. 0.1		Dep. 24		-10		Precipitation		0.01 inch		15		6.11		Date: 26		283.4		43	
Season to date		Season to date		Season to date		Season to date		Season to date		Season to date		Season to date		Season to date		Season to date		Season to date		Season to date		Season to date		Season to date	
Maximum Temp		Minimum Temp.		2005		746		Thunderstorms		0		Precipitation		Snow, Sleet		Greatest in 24 hours and dates		Greatest depth on ground of snow, sleet or ice and date		4		26		4	
Heavy fog		X		4		4.17		26-27		4.21		25-26		4		26		4		26		4		26	

HOURLY PRECIPITATION (Water equivalent in inches)

Date	A. M. Hour ending at												P. M. Hour ending at												Date	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12		
1	T	T	T	T	T			T		T	T	T	T	T	T	T	T	.01	T	.01	.01	.01	T		1	
2																									2	
3																				T	T				3	
4																						T			4	
5	T	T	T	T																					5	
6																									6	
7																									7	
8		T		.02	.01	.01	.03	.03	.03	.01	.02	.12	.15	.06	.02	.04	.03	.07	.07	.19	.06	.08	.06	.05	.10	8
9	.05	.11	.05	T	T	T	T	T	T	T	T	T				T	T	T	.02	.02	.06	.19	.13	.02		9
10																									10	
11	.03	.04	.03	.12	.27	.16	.06	.02	T	.01	T	.02				T	T	T	T	.02	.02	.06	.19	.13	.02	11
12																									12	
13																									13	
14																									14	
15	.05	.03	.01	.01	T	.01	.01	.01	T	T	T	T		T	T	T	T	.01	.02	.03	.03	.04	.03	.10	.09	15
16																									16	
17																									17	
18																									18	
19	.01	.02	.08	.05	.01	.01	T	T		T													T	.02		19
20																									20	
21																									21	
22		T	T	T	T	.03	.07	.01	.01	.04	.05	.11		.25	.24	.12	.28	.05	.05	T	T	T				22
23																									23	
24	T	T	T	T	T	.01	.02	T	T	T	.01	T		T										T		24
25																									25	
26	.02	.02	.02	.01	.04	.09	.12	.15	.14	.16	.24	.31		.40	.41	.24	.04	.04	.11	.16	.14	.16	.16	.12	.21	26
27	.13	.26	.20	.10	.06	.02	.01	T				T		T	.03	T	T			T	.02	.05	.09	.04		27
28	.02	.01	.02	T	T	T	T																			28
29																										29
30																										30
31					T	T	.01	T	.01	.02	.13	.01		.03	.03	.02	.02	T	T							31

DAY 01										DAY 02										DAY 03									
01	10	38	8	54	34	32	82	29	22	13	10	20	12	32	30	79	26	35	18	10	80	15	20	29	31	14	24	12	
02	10	38	8	54	34	32	82	29	20	10	10	30	12	31	28	72	23	31	18	10	30	15	20	27	32	16	24	12	
03	10	35	7	54	34	32	79	28	20	9	2	UNL	12	25	23	69	16	30	22	4	UNL	8	21	27	64	20	19	7	
04	10	40	8	54	36	33	76	24	15	3	0	UNL	15	28	26	51	12	31	21	15	UNL	8	37	32	59	24	27	8	
05	10	35	4	54	36	34	74	20	10	4	0	UNL	15	34	27	47	10	31	14	10	UNL	8	44	37	69	26	22	7	
06	10	18	4	54	36	33	73	19	03	11	7	UNL	15	33	26	33	07	29	17	7	UNL	10	41	37	63	30	17	7	
07	10	9	2	54	34	32	72	12	15	15	9	CIR	15	31	25	40	09	29	14	9	35	10	40	35	62	28	31	7	
08	10	11	5	54	32	31	69	29	36	21	8	00	15	29	24	47	11	28	14	10	80	10	35	39	62	30	31	7	
DAY 04										DAY 05										DAY 06									
01	0	UNL	12	32	28	59	19	28	11	10	30	12	5	27	24	66	17	35	8	0	UNL	15	24	21	60	12	31	13	
02	0	UNL	12	28	25	66	18	29	14	10	29	12	5	27	24	63	16	32	12	0	UNL	15	22	20	55	12	31	13	
03	0	UNL	6	26	23	66	16	30	14	0	UNL	12	5	27	24	63	16	32	15	0	UNL	15	24	19	62	11	31	13	
04	0	UNL	6	30	23	66	15	31	9	0	UNL	15	5	32	26	47	14	34	15	0	UNL	15	27	23	51	11	30	18	
05	0	UNL	15	34	28	68	16	33	9	1	UNL	15	5	32	29	44	15	32	15	0	UNL	15	33	27	62	12	30	13	
06	0	UNL	15	31	27	51	13	34	12	0	UNL	15	5	34	28	44	15	32	12	0	UNL	15	35	23	57	11	31	14	
07	0	UNL	15	29	25	53	14	32	11	0	UNL	15	5	30	25	44	15	35	13	0	UNL	15	32	25	58	09	30	13	
08	0	UNL	15	28	24	58	15	32	12	0	UNL	15	5	26	22	55	12	35	15	0	UNL	15	30	24	63	09	31	17	
DAY 07										DAY 08										DAY 09									

2011

CHINESE COLUMN

100 indicates an unlimited ceiling.
 610 indicates a conform cloud ceiling of unknown height.

WJ 91113 K 4 011 51N

T	Tornado
T	Thunderstorm
T	Typhoon
R	Rain
R	Rain showers
R	Freezing rain
T	Drizzle
Z	Freezing drizzle
S	Snow
SP	Snow pellets
S	Ice crystals
SW	Snow showers
S	Snow grains
S	Sleet
A	Hard
AP	Softly hard
F	Fog
H	Ice fog
F	Ground fog
HD	Blowing dust
HS	Blowing sand
HS	Blowing silt
HS	Blowing spray
K	Smoke
H	Haze
D	Dust

WIND COLUMNS

Directions are those from which the wind flows, indicated in tens of degrees from true South, i. e., 19 for East, 19 for South, 27 for West. Entry of 00 in the direction column indicates calm.

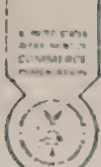
Speed is expressed in knots
multiply by 1.15 to convert
to miles per hour.

ADDITIONAL DATA

ADDITIONAL DATA
Other observational data contained in records on file can be furnished at cost via microfilm or microfiche copies of the original records. Inquiries as to availability and costs should be addressed to:
Director, National Weather Records Center, Federal Building, Asheville, N. C. 28801

STATION: BOSTON MASS

YEAR & MONTH: 09 12



LOCAL CLIMATOLOGICAL DATA

U.S. DEPARTMENT OF COMMERCE
MAURICE H. STANS, Secretary
ENVIRONMENTAL SCIENCE SERVICES ADMINISTRATION
ENVIRONMENTAL DATA SERVICE

BOSTON, MASSACHUSETTS
LOGAN INTERNATIONAL AIRPORT
JANUARY 1976

Latitude 42° 22' N Longitude 71° 02' W		Elevation (ground) 15 ft.		Standard time used EASTERN																	
Temperature (°F)										Precipitation		Wind				Sunshine		Sky cover (Tenths)		Date	
Date	Maximum	Minimum	Average	Departure from normal	Average dew point	Degree days (Base 65°)		Weather types shown by code 1-9 on dates of occurrence	Snow, sleet, or ice on ground at 07AM (in.)	Water equivalent (in.)	Snow, sleet (in.)	Avg. station pressure (in.)		Fastest mile		Hours and tenths	Percent of possible	Sunrise to sunset	Midnight to midnight		
						Heating	Cooling					Residual	Residual	Average speed	Speed				Direction		Midnight
1	29	16	23	-7	6	42	0	0	0	0	0	29.89	30	13.2	13.5	17	Na	9.8	63	7	
2	28	19	24	-6	7	41	0	1	0	0	0	29.87	29	16.5	16.7	19	Na	9.3	100	0	
3	30	17	24	-6	13	41	0	1	0	.14	2.2	29.94	30	4.6	6.5	15	Na	9.6	61	5	
4	27	19	23	-7	11	42	0	3	0	.02	.2	29.94	32	11.7	12.4	17	Na	8.7	94	7	
5	30	18	24	-6	12	41	0	3	0	0	0	30.11	27	14.0	15.0	19	Na	9.2	100	0	
6	31	23	27	-3	15	38	0	3	0	0	0	30.04	28	11.1	12.4	18	Na	8.6	93	1	
7	26	19	23	-7	11	42	0	2	0	.07	.7	29.81	35	11.1	11.5	17	Na	9.0	5	10	
8	24	13	19	-11	8	46	0	2	0	.01	.1	29.71	32	9.5	9.9	16	Na	8.6	72	2	
9	22	10	16	-14	5	49	0	2	0	0	0	29.72	29	17.0	17.5	25	Na	9.3	100	0	
10	26	13	20	-10	6	45	0	2	0	0	0	29.67	28	19.2	19.7	29	Na	4.8	52	9	
11	28	14	21	-9	6	44	0	2	0	0	0	29.84	28	17.7	17.8	27	Na	9.3	100	0	
12	21	13	17	-13	9	48	0	8	1	.04	.8	29.92	34	4.7	5.0	14	Na	0.9	10	10	
13	30	19	25	-5	13	40	0	8	1	.01	.2	29.80	29	15.6	16.3	25	Na	8.8	94	2	
14	21	12	17	-13	1	48	0	1	0	0	0	29.86	30	19.5	19.7	26	Na	9.3	99	0	
15	27	9	18	-12	-2	47	0	1	0	0	0	30.04	30	22.3	22.4	27	Na	9.4	100	0	
16	36	10	26	-4	8	39	0	1	0	0	0	30.14	26	7.8	9.9	17	Sw	9.3	100	3	
17	44	31	38	3	27	27	0	1	0	.05	0	29.86	25	8.0	8.2	17	Sw	0.6	6	10	
18	36	17	27	-3	26	38	0	1	0	.25	.9	29.74	02	10.3	11.5	20	Na	0.0	0	10	
19	21	9	15	-15	2	50	0	1	0	0	0	29.99	32	10.3	10.4	19	Na	6.5	68	5	
20	22	10	16	-14	4	49	0	1	0	.01	.1	29.97	31	3.0	6.3	16	Na	8.2	86	3	
21	20	4	12	-18	0	53	0	1	0	.04	.5	29.72	33	18.5	20.9	35	Na	6.7	70	7	
22	19	3	11	-19	-11	54	0	1	0	0	0	29.99	30	16.7	17.1	29	Na	9.6	100	1	
23	27	9	18	-12	4	47	0	1	0	.01	.1	29.93	25	10.2	10.9	22	Sw	6.6	68	10	
24	25	13	19	-11	5	46	0	1	0	0	0	29.96	32	9.7	10.4	17	N	9.4	97	0	
25	31	18	25	-5	15	40	0	1	0	.15	1.5	29.88	25	4.2	6.8	15	W	0.2	2	10	
26	33	26	30	0	25	35	0	1	0	.05	.1	29.60	34	5.9	6.6	14	Na	2.1	21	9	
27	33	24	29	-1	20	36	0	1	0	0	0	30.00	32	3.3	6.5	15	N	0.4	4	9	
28	37	23	30	0	23	35	0	1	0	0	0	30.20	17	3.8	6.9	23	Sw	6.8	69	6	
29	49	37	43	13	38	22	0	1	0	.04	0	29.62	22	12.8	14.4	23	Sw	0.0	0	10	
30	46	22	34	4	21	31	0	0	0	0	0	29.72	29	15.0	16.3	24	Na	1.6	16	9	
31	33	19	26	-4	6	39	0	0	0	0	0	30.04	27	11.5	14.2	18	W	10.0	100	2	
Sum	912	515				1295	0					29.89	29	9.9	12.7	35	Na	183.8		157	
Avg.	29.4	16.6	25.0	-6.9	11	207												296.2	62	5.1	
Season to date										Snow, sleet		For the month		Total		Sum		Sum		Date	
Number of days										- 10 inch		2		Greatest in 24 hours and dates		Greatest depth on ground of snow, sleet or ice and date		Avg.			
Maximum Temp.										Thunderstorms		Precipitation		Snow, Sleet		3		6+			
Minimum Temp.										Heavy fog		X		0		0		0			
22										0		0		0		0		0			

HOURLY PRECIPITATION (Water equivalent in inches)

Date	A. M. Hour ending at												P. M. Hour ending at												Date
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	
2																									1
3																									2
4	.02	T	T	T													T	.01	.04	T	T	.01	.03	.03	3
5																									4
6																									5
7																									6
8																									7
9	T	T					T	.02	.03	T	.02	T	T	T	T	T			T	T	T	T	.01	T	8
10																									9
11																									10
12																									11
13	T	T	T	.01	T	T	T					T	.01	T	.01	T	T	T	T	T	T	.01	T	T	12
14																									13
15																									14
16																									15
17																									16
18	.02	.02	.02	.03	.02	.01	.04	.04	.04	.01	T	T	T	T	T	T				T	T	T	T	.03	17
19																									18
20																									19
21	.01	.01	.01	.01	T	T	T					T													20
22	T	T																							21
23																									22
24	T																								23
25																									24
26	.01	.01	.01	.01	.01	T						T	T	T	T	.01	.03	.03	.02	.01	T	T	.01		25
27																									26
28																									27
29																									28
30																									29
31																									30
																									31

• Extreme temperatures for the month. May be the last of more than one occurrence.
- Below zero temperature or negative departure from normal.
† = 70° at Alaskan stations.
Also on an earlier date, or dates.
X Heavy fog restricts visibility to 1/4 mile or less.
In the Hourly Precipitation table and in columns 9, 10, and 11 indicates an amount too small to measure.

The season for degree days begins with July for heating and with January for cooling.
Data in columns 6, 12, 13, 14, and 15 are based on 8 observations per day at 3-hour intervals.
Wind directions are those from which the wind blows. Resultant wind is the vector sum of wind directions and speeds divided by the number of observations.
Figures for directions are tens of degrees from true North; i.e., 09 = East, 18 = South, 27 = West, 36 = North, and 00 = Calm. When directions are in tens of degrees in Col. 17, entries in Col. 16 are fastest observed 1-minute speeds. If the / appears in Col. 17, speeds are gusts.

Any errors detected will be corrected and changes in summary data will be annotated in the annual summary.

Subscription Price: Local Climatological Data \$1.00 per year including annual Summary if published. Single copy: 10 cents for monthly Summary; 15 cents for annual Summary. Checks or money orders should be made payable and remittances and correspondence should be sent to the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20540.

I certify that this is an official publication of the Environmental Science Services Administration, and is compiled from records on file at the National Weather Records Center, Asheville, North Carolina 28801.

William H. Haggard
Director, National Weather Records Center

SUMMARY BY HOURS

AVERAGES											Rev. total
Hour (Local time)	Sky cover in tenths	Station pressure (in.)	Dry bulb (°F)	Wet bulb (°F)	Rel. hum. (%)	Dew point (°F)	Wind speed (mph)	Direction	Speed (mph)	Temp.	
01	5	29.88	21	19	93	10	2.4	30	9.5		
04	5	29.88	20	18	63	9	12.7	30	10.3	</	
07	5	29.90	20	17	63	9	13.1	30	10.4		
10	5	29.92	23	20	58	10	12.6	30	10.3		
13	5	29.85	27	23	55	12	12.7	30	10.3		
16	6	29.87	27	23	54	12	12.9	30	9.7		
19	5	29.89	26	22	59	13	12.2	29	9.5		
22	5	29.89	24	21	61	11	12.6	29	9.5		

NOTES

4 FILING COLUMN

1 NE indicates an unbraked

0 cable

3 BR indicates a cardinal

8 direction of unknown

7 height

WEATHER COLUMN

1

2

3

4 T Tornado

5 F Frost, blizzard

6 S Squall

7 R Rain

8 RW Rain showers

9 ZR Freezing rain

0 D Drizzle

1 ZI Freezing drizzle

2 S Snow

3 SP Snow pellets

4 IC Ice crystals

5 SW Snow showers

6 SG Snow grains

7 S Sleet

8 A Hail

9 AP Small hail

0 F Fog

1 H Ice fog

2 G Ground fog

3 BD Blowing dust

4 BS Blowing sand

5 SN Blowing snow

6 BY Blowing spray

7 K Smoke

8 H Haze

9 D Dust

WIND COLUMN

13

12

11

10

9

8

7

6

5

4

3

2

1

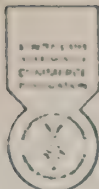
0

Directions are those from which the wind blows, indicated in tens of degrees from true North; i.e., 09 for East, 18 for South, 27 for West. Entry of 00 in the direction column indicates calm.

Speed is expressed in knots multiply by 1.15 to convert to miles per hour.

STATION: BOSTON MASS YEAR & MONTH: 79 01

YEAR & MONTH: 79 01



LOCAL CLIMATOLOGICAL DATA

U.S. DEPARTMENT OF COMMERCE
MAURICE H. STANS, Secretary
ENVIRONMENTAL SCIENCE SERVICES ADMINISTRATION
ENVIRONMENTAL DATA SERVICE

BOSTON, MASSACHUSETTS
LOGAN INTERNATIONAL AIRPORT
FEBRUARY 1970

Latitude 42° 22' N Longitude 71° 02' W		Elevation (ground)		15 ft.		Standard time used: EASTERN																						
Temperature (°F)						Weather types shown by code		Snow, sleet, or ice on ground at 07AM		Precipitation		Avg. station pressure (in.)		Wind			Sunshine		Sky cover (Tenths)									
						1-9 on dates of occurrence				Water equivalent (in.)		Snow, sleet (in.)		Direction		Fastest mile		Hours and tenths		Percent of visible		Sunrise to sunset		Moonrise to midnight		Date		
						123 456 789						29 feet and inch		Resultant direction		Speed (mph)		Hours and tenths		Percent of visible		Sunrise to sunset		Moonrise to midnight				
1	2	3	4	5	6	7A	7B	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22						
1	45	32	39	9	23	26	0		0	0		29.97	24	13.0	13.1	13	SW	0.6	6	10	8	1						
2	53	35	44	14	35	21	0	1	0	.17	0	29.89	20	15.7	16.3	43	SW	1.3	12	10	10	2						
3	53	43	51	21	47	14	0	2	0	1.27	0	29.68	19	15.4	17.0	57	S	0.0	0	10	10	3						
4	44	11	28	-2	11	37	0	1	4	.69	5	29.81	30	18.4	18.6	32	NW	6.0	67	5	5	4						
5	31	10	21	-9	4	44	0	1	0		1	30.67	21	1.0	1.0	11	W	4.0	64	7	6	5						
6	34	27	31	1	23	34	0		0	.02	2	30.58	11		2.0	10	S	2.0	20	9	7	6						
7	40	26	33	3	25	32	0		0	0	0	30.40	03	1.7	4.2	9	SE	2.8	93	0	0	7						
8	44	30	37	7	26	28	0		0	0	0	30.27	18	2.1	6.3	9	SE	9.3	91	8	5	8						
9	43	33	38	8	27	27	0		0	0	0	30.27	14	4.8	6.2	14	E	6.7	63	9	9	9						
10	45	36	41	11	36	24	0	1	0	1.17	0	29.90	09	12.9	13.2	27	E	0.0	0	10	10	10						
11	47	31	39	9	35	26	0	1	0	.22	0	29.18	24	12.3	14.8	33	W	0.4	4	10	9	11						
12	37	25	31	1	11	34	0		0	0	0	29.48	28	22.1	22.4	41	W	10.5	100	1	2	12						
13	34	15	25	-5	7	40	0		0	0	0	29.88	29	13.8	16.1	31	NW	6.7	64	6	5	13						
14	28	12	20	-10	-1	45	0		0	0	0	30.38	25	7.8	9.6	24	NW	9.2	87	6	6	14						
15	38	22	30	0	28	35	0	1	4	.70	4	30.13	07	6.4	12.1	23	E	0.0	0	10	10	15						
16	36	25	31	1	18	34	0		0	0	0	30.13	29	9.4	11.7	22	NW	10.5	98	1	5	16						
17	38	24	31	1	23	34	0		0	0	0	30.14	07	4.1	6.2	13	SE	8.6	80	8	7	17						
18	40	31	36	6	30	29	0		0	0	0	29.83	20	1.0	7.1	24	SW	8.0	75	9	8	18						
19	47	26	37	7	30	28	0	1	0	0	0	29.52	28	10.3	13.7	23	NW	5.3	49	7	6	19						
20	36	18	27	-3	9	36	0		0	0	0	29.94	30	14.1	14.7	24	W	10.6	98	3	1	20						
21	36	22	29	-2	11	36	0		0	0	0	30.16	28	14.7	15.2	22	W	10.7	98	3	2	21						
22	51	26	39	8	23	26	0		0	0	0	29.88	23	15.9	16.3	30	SW	8.7	80	8	6	22						
23	44	20	32	1	6	33	0		0	0	0	29.85	30	20.9	21.7	38	NW	10.7	97	0	0	23						
24	36	20	28	-3	15	37	0		0	0	0	29.95	10	3.0	11.7	17	NE	6.7	61	7	7	24						
25	54	19	37	6	27	28	0		0	0	0	29.56	28	8.3	10.9	23	NW	3.6	32	9	9	25						
26	25	7	16	-16	-8	49	0		0	0	0	29.96	33	12.6	13.2	28	NW	10.7	97	0	2	26						
27	35	18	27	-5	12	38	0		0	0	0	30.17	15	4.9	7.3	13	SE	4.3	39	8	7	27						
28	35	30	33	1	31	32	0	1	0	.41	5	30.20	11	7.9	9.4	15	SE	0.0	0	10	10	28						
Sum		Sum			Total	Total				Total	Total	For the month:						Total	Sum	Sum								
134	674				909	0		Number of days		4.65	10.5	29.99	26	4.9	12.0	57	5	168.2	134	674								
Avg	Avg	Avg	Dep.	Avg	Dep.	Dep.		Precipitation		Dep.								Date: 03										
40.5	24.1	32.3	2.0	20	-63			≤ .01 inch	3	1.33									296.0	271	6.6	6.1						
Number of days		Season to date		Total	Total			Snow, sleet		Greatest in 24 hours and dates				Greatest depth on ground of snow, sleet or ice and date														
Maximum Temp.		Minimum Temp.		42.0	0			Thunderstorms	0	Precipitation				Snow, Sleet				Greatest depth on ground of snow, sleet or ice and date										
32	90	32	0	Dep.	Dep.			Heavy fog	X	1	2.96	3-4	5.2	28				5	28									

HOURLY PRECIPITATION (Water equivalent in inches)

A. M. Hour ending at												P. M. Hour ending at												Date	
1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	Date	
1																								1	
2																								2	
3																								3	
4	.18	.11	.14	.08	.09	.06	.03	T	.07	.09	.06	.04	.12	.13	.16	T	T	T	.02	.04	.04	.04	.02	.01	4
5																								5	
6	.01	T	T	T	T	T	.01	T			T	T	T	T	T						T	T	T	T	6
7																								7	
8																								8	
9																								9	
10																								10	
11	.11	.07	.03				.01	T				T	T	T	.02	.03	.03	.12	.25	.13	.10	.14	.14	.07	11
12																								12	
13																								13	
14																								14	
15	T	T	.03	.03	.04	.07	.04	.04	.03	.04	.03	.05	.06	.04	.02	.01	.07	.07	.03	T				15	
16																								16	
17																								17	
18																								18	
19																								19	
20																								20	
21																								21	
22																								22	
23																								23	
24																								24	
25																								25	
26																								26	
27																								27	
28	.01	T	T	T	.01	.03	.08	.03	.04	.04	.02	.02	.01	.03	.01	.02	T	.04	.02	T	T	T	T	28	

* Extreme temperatures for the month. May be the last of more than one occurrence.
- Below zero temperature or negative departure from normal.
T = 70° at Alaskan stations.
Also on an earlier date, or dates.
Heavy fog restricts visibility to 1/4 mile or less.
In the Hourly Precipitation table and in columns 9, 10, and 11 indicates an amount too small to measure.

The season for degree days begins with July for heating and with January for cooling.
Data in columns 6, 12, 13, 14, and 15 are based on 8 observations per day at 3-hour intervals.
Wind directions are those from which the wind blows. Resultant wind is the vector sum of wind directions and speeds divided by the number of observations.
Figures for directions are in tens of degrees from true North, i.e., 09 = East, 18 = South, 27 = West, 36 = North, and 00 = Calm. When directions are in tens of degrees in Col. 17, entries in Col. 16 are fastest observed 1-minute speeds. If the / appears in Col. 17, speeds are gusts.

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I certify that this is an official publication of the Environmental Science Services Administration and is compiled from records on file at the National Weather Records Center, Asheville, North Carolina 28801.

William J. Haggard
Director, National Weather Records Center

SUMMARY BY HOURS

AVERAGE												Percent										
Weight (lb)	100	110	120	130	140	150	160	170	180	190	200	210	220	230	240	250	260	270	280	290	300	Speed (m.p.h.)
9.99	30	27	65	19	1.5	27	5.9															
9.98	29	27	68	20	1.1	26	5.7															
9.90	29	26	63	19	1.0	26	4.4															
9.01	32	29	63	20	1.5	27	5.0															
9.96	36	31	58	23	2.3	28	4.2															
9.95	36	32	57	21	2.5	27	3.2															
9.96	36	30	60	20	2.3	25	5.2															
9.91	32	29	63	21	2.5	28	4.2															

OBSERVATIONS AT 3-HOUR INTERVALS

DAY 01	DAY 02	DAY 03	DAY 04	DAY 05	DAY 06	DAY 07	DAY 08	DAY 09	DAY 10	DAY 11	DAY 12	DAY 13	DAY 14	DAY 15	DAY 16	DAY 17	DAY 18	DAY 19	DAY 20	DAY 21	DAY 22	DAY 23	DAY 24	DAY 25	DAY 26	DAY 27	DAY 28
01 7 133 15 04 10 90 10 07 8 100 10 10 10 127 12 13 10 127 12 16 10 100 10 19 8 100 10 22 0 100 15	32 28 01 20 23 14 7 0 15 36 10 02 22 23 10 9 100 12 35 10 59 22 24 15 8 140 12 38 13 55 23 24 12 10 110 10 42 15 49 24 25 15 10 100 10 43 16 40 25 24 9 10 80 8 43 16 40 25 24 8 10 10 4 43 16 55 25 24 8 10 13 4	40 34 53 24 24 7 10 12 7 36 33 70 27 19 7 10 7 7 38 34 70 29 19 10 10 3 3 42 17 60 29 19 6 10 2 0 46 40 61 33 17 10 10 6 0 50 46 74 42 19 19 10 15 10 52 49 80 46 19 20 10 12 6 52 49 80 46 21 24 10 11 5	51 49 86 47 22 13 52 48 89 47 22 13 55 45 93 46 17 3 55 44 93 43 10 8 58 46 83 43 09 4 57 55 87 43 09 4 56 52 90 51 08 26 52 50 90 49 20 13	10 08 53 -04 30 7 10 46 6 11 08 48 -05 30 3 10 19 4 12 09 48 -04 35 2 10 9 3 18 15 47 01 22 3 10 22 4 20 21 53 01 12 6 10 17 2 30 24 38 07 19 5 10 0 2 30 24 45 11 19 4 0 0 4 28 23 63 17 19 4 0 0 4	29 26 49 20 18 7 30 27 49 21 32 4 28 26 76 21 35 5 30 28 75 21 08 3 32 30 75 25 14 2 33 36 72 25 22 2 31 29 70 25 22 3 31 29 82 26 17 1	31 29 73 24 30 3 0 0 4 28 26 78 22 35 3 0 0 5 27 25 78 21 36 3 0 0 5 33 30 67 23 33 4 9 0 2 38 34 05 27 09 6 10 0 8 37 33 05 26 11 4 9 0 8 34 32 79 26 19 3 8 0 8 33 31 79 27 22 3 8 0 8	33 30 75 26 20 4 5 0 1 32 30 75 25 31 2 9 0 4 31 28 72 23 22 3 10 0 5 37 33 65 26 26 3 10 0 3 42 36 55 27 13 3 8 0 5 39 35 67 29 12 7 10 0 15 38 34 65 27 17 6 10 0 8 30 32 62 24 00 0 10 0 7	37 35 85 33 12 5 10 6 6 37 36 89 34 08 7 9 5 7 38 36 86 34 10 9 10 8 8 41 39 82 36 08 12 10 7 5 40 38 86 36 08 9 10 11 6 41 39 86 37 08 15 10 12 6 44 42 83 39 09 20 8 10 12 44 42 86 40 11 15 10 43 15	30 29 85 26 24 10 10 15 12 30 28 78 24 28 10 10 12 12 29 27 73 22 27 16 10 0 7 31 27 59 18 29 15 10 45 3 34 28 46 15 30 14 10 0 15 35 28 40 13 35 10 3 0 15 31 25 43 12 36 3 8 25 12 30 25 54 15 04 3 2 0 12	14 10 35 -09 30 18 10 50 12 12 09 42 -07 29 4 10 10 1 14 11 46 -03 24 9 10 16 1 19 15 41 -01 25 5 10 10 1 24 19 33 -01 23 8 10 6 0 27 20 28 -02 26 9 10 3 3 25 20 42 05 20 8 10 3 4 25 21 50 09 20 6 10 6 4	26 23 66 10 02 3 2 10 10 27 25 69 18 20 4 10 20 8 27 25 72 19 02 2 10 20 7 31 28 60 21 39 5 10 35 8 30 32 67 26 11 10 8 12 37 34 73 29 08 8 8 15 37 34 76 30 07 4 8 12 34 32 79 28 00 7 8 120 10	32 30 82 27 36 5 33 31 82 28 01 3 33 31 79 27 01 4 37 34 73 29 02 4 38 34 70 29 00 8 38 36 79 32 10 8 38 30 79 32 20 11 30 35 69 33 22 14	27 22 47 09 27 12 0 0 15 27 23 58 14 23 10 0 0 15 28 25 61 16 20 7 0 0 15 29 27 70 23 33 6 2 0 15 32 26 43 12 31 23 10 0 15 28 22 31 01 29 16 10 0 15 22 17 28 -06 28 20 10 140 15 17 13 29 -10 30 18 10 55 12	14 10 35 -09 30 18 10 50 12 12 09 42 -07 29 4 10 10 1 14 11 46 -03 24 9 10 16 1 19 15 41 -01 25 5 10 10 1 24 19 33 -01 23 8 10 6 0 27 20 28 -02 26 9 10 3 3 25 20 42 05 20 8 10 3 4 25 21 50 09 20 6 10 6 4	26 23 66 10 02 3 2 10 10 27 25 69 18 20 4 10 20 8 27 25 72 19 02 2 10 20 7 31 28 60 21 39 5 10 35 8 30 32 67 26 11 10 8 12 37 34 73 29 08 8 8 15 37 34 76 30 07 4 8 12 34 32 79 28 00 7 8 120 10	32 30 82 27 36 5 33 31 82 28 01 3 33 31 79 27 01 4 37 34 73 29 02 4 38 34 70 29 00 8 38 36 79 32 10 8 38 30 79 32 20 11 30 35 69 33 22 14	01 10 10 7 04 10 11 6 07 10 10 5 10 10 10 5 13 10 28 8 16 1 0 12 19 0 0 12 22 0 0 15	39 37 86 35 23 18 0 0 15 40 38 86 36 23 24 0 0 15 40 39 89 37 24 8 1 0 15 43 40 79 37 27 10 8 0 15 45 40 65 34 31 13 0 0 15 48 37 51 27 32 15 3 0 15 36 30 48 18 33 8 0 0 15 30 25 31 14 32 9 0 0 15	24 21 55 10 32 13 0 0 15 20 17 54 09 31 10 0 0 15 20 17 52 05 30 12 0 0 15 21 46 07 31 10 6 0 15 33 26 40 11 30 10 5 0 15 34 26 34 08 29 19 0 0 15 31 25 41 10 29 13 0 0 15 28 23 49 11 27 19 0 0 15	20 22 92 10 29 12 24 23 53 09 29 13 23 20 55 09 27 9 28 23 49 11 26 13 33 27 44 13 25 15 35 28 38 12 30 15 31 25 41 10 30 14 29 24 45 10 28 15	28 24 51 12 25 9 1 0 10 26 23 60 14 23 11 1 0 15 29 26 61 17 21 12 0 0 15 35 30 59 22 22 17 0 0 15 45 38 49 27 24 23 0 0 15 50 41 44 29 24 17 0 0 15 48 40 50 30 23 13 0 0 15 46 40 58 32 25 11 0 0 15	42 38 68 32 20 12 0 0 15 40 33 49 22 28 20 6 46 15 34 27 37 14 34 12 10 100 10 29 22 30 01 30 20 8 120 15 29 22 30 01 30 27 8 100 15 29 21 20 -07 31 23 1 0 15 24 18 24 -08 32 14 10 13 15 20 15 31 -06 32 7 10 12 15	20 15 33 -05 29 10 22 18 48 05 23 8 24 21 60 12 17 4 31 25 45 12 25 10 33 28 52 17 06 15 32 29 69 23 07 12 32 30 75 25 09 10 34 32 82 29 12 12	18 14 41 -02 33 18 0 0 15 11 06 48 -05 32 16 6 140 10 07 05 37 -14 34 12 10 100 10 13 09 31 -12 33 14 7 90 12 22 10 20 -08 32 12 9 30 15 24 18 23 -09 30 13 10 50 15 21 10 26 -09 32 4 10 100 15 20 15 34 -04 05 3 10 30 4	19 15 37 -03 36 5 18 14 43 -01 01 3 23 20 55 09 28 5 29 25 53 14 18 7 32 27 52 16 15 8 33 28 56 19 15 9 32 28 61 20 17 7 30 28 76 24 14 7	32 31 89 28 12 7 34 33 89 31 11 7 34 33 92 32 13 10 34 34 96 33 18 7 34 33 92 32 11 11 34 33 92 32 11 11 32 31 92 30 11 7 32 30 82 27 32 5	

NOTES

CHINESE COLUMN

UNL indicates an unlimited ceiling.
CLR indicates a cirrus cloud ceiling of unknown height.

WEATHER COLUMN

T Tornado
TS Thunderstorm
S Squall
R Rain
RS Rain showers
ZR Freezing rain
D Drizzle
ZD Freezing drizzle
SN Snow
SP Snow pellets
IC Ice crystals
SW Snow showers
SG Snow grains
E Sheet
A Hail
AP Small hail
F Fog
IF Ice fog
GF Ground fog
BD Blowing dust
BS Blowing sand
BW Blowing snow
BY Blowing spray
K Smoke
H Haze
D Dust

WIND COLUMNS

Directions are those from which the wind blows, indicated in tens of degrees from true North; i.e., 09 for East, 18 for South, 27 for West. Entry of 00 in the direction column indicates calm.

Speed is expressed in knots; multiply by 1.15 to convert to miles per hour.

ADDITIONAL DATA

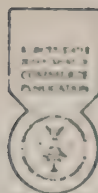
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Director, National Weather Records Center, Federal Building, Asheville, N. C. 28801

STATION: BOSTON MASS

YEAR & MONTH: 70 02



900



LOCAL CLIMATOLOGICAL DATA

U.S. DEPARTMENT OF COMMERCE
MAURICE H. STANS, Secretary
ENVIRONMENTAL SCIENCE SERVICES ADMINISTRATION
ENVIRONMENTAL DATA SERVICE

BOSTON, MASSACHUSETTS
LOGAN INTERNATIONAL AIRPORT
APRIL 1970

Latitude 42° 22' N Longitude 71° 02' W Elevation (ground) 13 ft

Standard time used: EASTERN

Temperature (°F)										Weather types on dates of occurrence		Snow, ice pellets or ice on ground at 07AM (In.)		Precipitation		Avg station pressure (In.)		Wind			Sunshine		Sky cover (Tenths)				
Date	Maximum	Minimum	Average	Departure from normal	Average dew point	Degree days (Base 65°)		1 Fog	2 Heavy fog	3 Thunderstorm	4 Ice pellets	5 Hail	6 Glaze	7 Duststorm	8 Smog, Haze	9 Blowing snow	Water equivalent (In.)	Snow, ice pellets (In.)	Resultant direction	Resultant speed (m.p.h.)	Average speed (m.p.h.)	Fastest mile	Hours and tenths	Percent of possible	Sunrise to sunset	Midnight to midnight	
						Heating	Cooling																				
1	48	38	43	-4	29	27	0																				
2	58	35	47	-4	40	16	0																				
3	49	39	44	1	23	21	0	1	4								1.83										
4	51	36	44	0	21	21	0																				
5	49	34	42	-2	18	23	0																				
6	43	30	36	-7	75	27	0																				
7	47	38	43	-2	33	22	0																				
8	67	38	53	8	29	12	0																				
9	72	52	62	16	40	3	0																				
10	52	39	46	0	25	19	0																				
11	51	35	43	-1	18	22	0																				
12	53	37	45	-2	28	20	0																				
13	55	42	49	2	35	16	0																				
14	55	42	49	1	34	16	0																				
15	55	40	48	0	33	17	0																				
16	55	40	48	0	35	17	0																				
17	63	42	53	4	34	12	0																				
18	60	44	52	3	34	13	0																				
19	58	40	49	0	19	16	0																				
20	46	38	42	-3	31	23	0																				
21	45	41	43	-7	38	22	0																				
22	58	42	50	-1	37	15	0																				
23	49	41	45	-6	36	20	0																				
24	57	43	50	-1	47	15	0																				
25	66	49	58	6	39	7	0																				
26	65	49	57	5	41	8	0																				
27	75	55	65	13	48	0	0																				
28	74	48	61	8	51	4	0																				
29	57	47	52	-1	44	13	0																				
30	73	48	61	7	40	4	0																				
Sum	1708	1232				Total	Total																				
Avg	56.9	41.1	49.0	1.1	33	Dep	Dep	Number of days																			
								Precipitation	0.01 inch	6																	
								Snow, ice pellets	0																		
								Thunderstorms	2																		
								Heavy fog	X	1	1.83																
								Clear	9			Partly cloudy	13														
								Cloudy	8																		

HOURLY PRECIPITATION (Water equivalent in inches)

Date	A. M. Hour ending at												P. M. Hour ending at												Date
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	
1																									1
2			T	.01	.01	.06	.10	.13	.11	.19	.31	.23	.16	.05	.14	.18	.03	.05	.07	T					2
3							T	T																	3
4																									4
5																									5
6																									6
7	T	.01	.01	T		T	.01	.01	T	T	T														7
8																									8
9						T																			9
10																.02	.01			.02	.07	T			10
11	T																								11
12																			T	T	T				12
13																									13
14																									14
15																									15
16																									16
17																									17
18															T	T									18
19																									19
20																									20
21										T	.01	T	.03	.03	.06	.01	T	.02	.03	T	T	T	.01		21
22			T	T								T	T	T	T		.05	.08	.02	.01	T				22
23																T									23
24			T	T	T	T	T	.01	.01	.02	.01	T	.02	.05	.05	.05	.09	.11	.02	T					24
25																									25
26																									26
27																									27
28																									28
29																									29
30																									30

* Extreme temperatures for the month. May be the last of more than one occurrence.
- Below zero temperature or negative departure from normal.
2 - 70° at Alaskan stations.
X Also on an earlier date, or dates.
N Heavy fog restricts visibility to 1/4 mile or less.
T In the Hourly Precipitation table and in columns 9, 10, and 11 indicates an amount too small to measure.

The season for degree days begins with July for heating and with January for cooling.

Data in columns 6, 12, 13, 14, and 15 are based on 8 observations per day at 3-hour intervals.

Wind directions are those from which the wind blows. Resultant wind is the vector sum of wind directions and speeds divided by the number of observations.

Figures for directions are tens of degrees from true North; i.e., 09 = East, 18 = South, 27 = West, 36 = North, and 00 = Calm. When directions are in tens of degrees in Col. 17, entries in Col. 16 are fastest observed 1-minute speeds. If the / appears in Col. 17, speeds are gusts.

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William H. Haggard

Director, National Weather Records Center

SUMMARY BY HOURS

AVERAGES												Resultant wind
Hour	Local time	Sky cover (tenths)	Station pressure (In.)	Dry bulb (°F)	Wet bulb (°F)	Rel. hum. %	Dew point (°F)	Air speed (m.p.h.)	Wind direction	Speed (m.p.h.)	Direction	
01	5:29.93	45	40	84	33	10.2	28	5.4				
04	5:29.94	43	36	87	32	8.7	28	6.4				
07	5:29.97	44	39	84	32	10.4	28	6.7				
10	5:29.97	50	43	55	34	13.6	31	2.7				
13	6:29.93	54	45	50	34	13.1	28	8				
16	6:29.79	54	45	52	34	13.8	23	1.6				
19	5:29.91	50	43	59	35	12.7	23	3.4				
22	4:29.94	48	42	62	34	11.2	27	3.0				

[illegible]NOTES

CHUNG, COLUMN

1 N1 indicates an unlimited ceiling.

WEATHER COLUMN—

- | | |
|----|------------------|
| T | Tornado |
| I | Ice storm |
| G | Gustail |
| R | Rain |
| RW | Rain showers |
| ZR | Freezing rain |
| I | Drizzle |
| ZI | Freezing drizzle |
| S | Snow |
| NP | Snow pellets |
| H | Ice crystals |
| NW | Snow showers |
| SG | Snow grains |
| JP | Ice pellets |
| A | Hail |
| F | Fog |
| H | Ice fog |
| GF | Fog and fog |
| BD | Blowing dust |
| B | Blowing sand |
| BN | Blowing snow |
| BY | Blowing spray |
| K | Smoke |
| H | Haze |
| D | Dust |

WIND COLUMNS -

Directions are those from which the wind blows, indicated in tens of degrees from true North: 1, e., 09 for East, 18 for South, 27 for West. Entry of 00 in the direction column indicates calm.

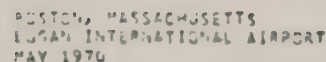
Speed is expressed in knots; multiply by 1.15 to convert to miles per hour.

ADDITIONAL DATA

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STATION: BOSTON MASS

YEAR & MONTH: 70 04



[illegible]

NOTES

CEILING COLUMN

LINE indicates an unlimited ceiling.

WEATHER COLUMN -

T	Tornado
Th	Thunderstorm
Q	Quail
R	Rain
RW	Rain showers
ZR	Freezing rain
I	Drizzle
ZI	Freezing drizzle
S	Snow
SP	Snow pellets
H	Ice crystals
SW	Snow showers
SG	Snow grains
IP	Ice pellets
A	Hail
F	Fog
FF	Ice fog
CF	Ground fog
BS	Blowing dust
BN	Blowing sand
BS	Blowing snow
BY	Blowing spray
K	Smoke
H	Haze
D	Dust

WIND COLUMNS -

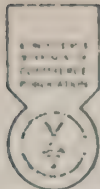
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STATION- BOSTON MASS

YEAR & MONTH: 70 05



LOCAL CLIMATOLOGICAL DATA

U.S. DEPARTMENT OF COMMERCE

MAURICE H. STANS, Secretary

ENVIRONMENTAL SCIENCE SERVICES ADMINISTRATION

ENVIRONMENTAL DATA SERVICE

BOSTON, MASSACHUSETTS
LOGAN INTERNATIONAL AIRPORT
JUNE 1970

Latitude 42° 22' N		Longitude 71° 02'		Elevation (ground) 15 ft		Standard time used EASTERN																
Temperature (°F)						Sunshine		Sky cover (Tenths)														
Date	Maximum	Minimum	Average	Departure from normal	Average dew point	Degree days (Base 65°)		Weather types on dates of occurrence	Snow, ice pellets or ice on ground at 07AM (in.)	Precipitation Water equivalent (in.)	Snow, ice pellets (in.)	Avg station pressure (in.)	Wind		Sunshine Hours and tenths	Percent of possible	Sunrise to sunset	Midnight to midnight	Date			
						Heating	Cooling						Resultant direction	Resultant speed (m.p.h.)						Fastest mile Speed (m.p.h.)	Direction	
1	2	3	4	5	6	7A	7B	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
1	89	63	76	11	61	0	11		0	0	0	30.08	21	7.0	8.8	17	S	13.4	89	2	2	1
2	88	64	76	11	63	0	11	8	0	0	0	30.01	22	12.5	12.9	24	SW	13.4	89	3	3	2
3	88	62	75	9	64	0	10	1 3	0	1.65	0	29.86	23	11.2	13.5	20	SW	11.2	74	5	5	3
4	65	57	61	-5	55	4	0	1	0	.05	0	30.00	10	4.1	8.1	17	NE	10.3	68	8	8	4
5	62	56	59	-7	56	6	0	1	0	.04	0	29.89	19	5.7	6.5	14	SW	0.0	0	10	9	5
6	59	50	55	-11	54	10	0	23	0	.88	0	29.75	04	4.9	5.0	14	N	0.0	0	10	10	6
7	59	51	55	-12	51	10	0	1	0	.18	0	29.90	03	4.9	7.2	12	NE	0.2	1	10	10	7
8	77	55	66	-1	57	0	1	1	8	.07	0	30.06	19	3.6	5.6	17	SE	14.2	94	1	2	8
9	87	61	74	7	59	0	9	1	8	0	0	30.05	22	9.4	9.8	22	SW	15.1	99	2	3	9
10	84	63	74	7	58	0	9		0	0	0	29.89	22	9.1	9.9	17	SW	14.4	95	2	8	10
11	90	62	76	9	61	0	11	8	0	0	0	29.78	25	9.8	10.4	25	NW	14.1	93	4	5	11
12	75	55	65	-3	55	0	0	1	8	.05	0	29.94	06	4.6	9.4	17	NE	6.3	41	7	7	12
13	65	55	60	-8	49	5	0	1	0	.01	0	30.16	08	6.6	9.5	18	E	15.3	100	2	2	13
14	73	51	62	-6	46	3	0		0	0	0	30.26	18	3.3	8.5	17	SW	15.3	100	3	2	14
15	78	55	67	-1	54	0	2		0	0	0	30.15	22	11.5	12.2	22	SW	15.0	98	2	1	15
16	77	58	68	0	57	0	3		0	0	0	30.10	24	9.9	10.2	17	SW	9.6	63	9	9	16
17	77	62	70	1	62	0	5	1		0	0	30.05	19	7.5	7.8	17	SW	2.8	19	10	10	17
18	78	65	72	3	66	0	7	1	8	.03	0	29.79	20	7.7	8.0	19	SW	4.6	30	9	10	18
19	87	66	77	8	61	0	12	8	0	0	0	29.84	25	7.9	9.1	18	SW	10.3	68	4	6	19
20	71	58	65	-4	43	0	0		0	0	0	29.65	29	15.4	15.7	22	NW	11.8	77	3	4	20
21	73	54	64	-5	48	1	0		0	.02	0	30.00	26	9.3	9.9	18	SW	9.7	63	8	7	21
22	71	58	65	-4	58	0	0	1	8	0	0	29.99	21	4.8	5.8	11	S	2.9	19	9	8	22
23	80	59	70	0	55	0	5	1	8	0	0	30.03	18	3.0	6.3	14	SE	11.7	76	2	1	23
24	86	61	74	4	54	0	9		8	0	0	29.96	20	10.1	10.5	25	SW	13.8	90	1	1	24
25	84	59	72	2	54	0	7		8	0	0	29.84	24	9.9	12.2	24	SW	14.2	93	9	7	25
26	63	55	59	-11	53	6	0	1		.84	0	29.96	06	10.3	10.4	17	NE	0.0	0	10	9	26
27	64	54	59	-11	56	6	0	1		.70	0	29.59	34	7.2	9.1	21	NW	0.0	0	10	10	27
28	76	52	64	-6	47	1	0		0	0	0	29.91	33	3.7	9.2	17	N	14.1	93	1	1	28
29	82	54	68	-2	52	0	3		8	0	0	30.07	21	10.4	11.7	20	SW	14.3	93	4	4	29
30	72	64	68	-3	61	0	3		8	.10	0	29.65	22	10.9	14.1	21	SW	0.0	0	10	10	30
Sum	Sum					Total	Total			Total	Total	For the month:				Total	% Sun	Sum	Sum			
2280	1740					52	118	Number of days		4.62	0	29.95	23	4.5	9.6	25	SW	278.0	for	177	174	
Avg	Avg					Dep.	Dep.	Precipitation		Dep.						Date	24	Precipitation	month	Avg	Avg	
75.0	58.0					16	13	< .01 inch	13	1.14								456.8	61	5.9	5.3	
Season to date						Snow, ice pellets																
Total						Total		= 1.0 inch		0		Greatest in 24 hours and dates		Greatest depth on ground of snow,								
Maximum Temp.						Minimum Temp.		3785		143		Thunderstorms		2		Precipitation		Snow, ice pellets				
- 90						< 32		< 32		0		Heavy fog		X		1.70		3 - 4		0		
1						0		0		0		Clear		11		Partly cloudy		5		Cloudy		

HOURLY PRECIPITATION (Water equivalent in inches)

Date	A. M. Hour ending at												P. M. Hour ending at												Date
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	
1																									
2																									
3																		.23	.18	.04	.07	.89	.21	.03	
4	.05	T							T	T	T	T	T	T	T		.02	.02							
5																									
6		.03	.03	.13	.02		T	T	.05	.19	.01	.15	.09	.05	T	.02	.01	T	.04	.02	T	.03	.02	T	
7	T	T	T	.01	T															T	T	.06	.07	.04	
8	.07																								
9																									
10																									
11																									
12											T	T										.03	.02		
13	.01																								
14																									
15																									
16																									
17																									
18	T	.01	.02											T	T					T					
19																									
20																									
21																		.01	.01	T		T	T		
22																									
23																									
24																									
25																									
26																									
27	.01	.13	.24	.16	.08	.02	.01	T	.18	.03	.04	.02	.06	.15	.03	T	T		T	.03	.11	.05	.07	.07	
28																				.01	.04				
29																									
30					T	.01													T						

* Extreme temperatures for the month. May be the last of more than one occurrence.
- Below zero temperature or negative departure from normal.
+ = 70° at Alaskan stations.
Also on an earlier date, or dates.
X Heavy fog restricts visibility to 1/4 mile or less.
T In the Hourly Precipitation table and in columns 9, 10, and 11 indicates an amount too small to measure.

The season for degree days begins with July for heating and with January for cooling.
Data in columns 6, 12, 13, 14, and 15 are based on 8 observations per day at 3-hour intervals.
Wind directions are those from which the wind blows. Resultant wind is the vector sum of wind directions and speeds divided by the number of observations.
Figures for directions are tens of degrees from true North; i.e., 0 = East, 10 = South, 20 = West, 30 = North, and 00 = Calm. When directions are in tens of degrees in Col. 17, entries in Col. 16 are fastest observed 1-minute speeds. If the / appears in Col. 17, speeds are gusts.

Any errors detected will be corrected and changes in summary data will be annotated in the annual summary.

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I certify that this is an official publication of the Environmental Science Services Administration, and is compiled from records on file at the National Climatic Center, Asheville, North Carolina 28801.

William H. Haggard
Director, National Climatic Center

SUMMARY BY HOURS

AVERAGES												Resultant wind	
Hour	Local time	Sky cover (in tenths)	Station pressure (in.)	Dry bulb (°F)	Wet bulb (°F)	Rel. hum. (%)	Dew point (°F)	Wind speed (m.p.h.)	Direction	Speed (m.p.h.)	Direction	Speed (m.p.h.)	Direction
01	5	29.95	63	58	78	55	9.1	25	4.8				
04	8	29.95	61	57	81	54	8.0	25	4.8				
07	8	29.97	64	59	72	55	9.6	25	4.8				
10	8	29.97	71	62	62	56	10.1	23	4.8				
13	7	29.94	73	63	59	56	10.5	21	4.8				
16	6	29.92	72	63	60	56	11.6	19	5.2				
19	6	29.93	68	61	68	56	9.6	20	5.3				
22	6	29.95	64	59	75	54	8.2	23	4.8				

YEAR & MONTH: 70 00



BOSTON, MASSACHUSETTS
LOGAN INTERNATIONAL AIRPORT
JULY 1970

Latitude 42° 22' N Longitude 71° 02' W Elevation (ground)

Standard time used: EASTERN

HOURLY PRECIPITATION (Water equivalent in inches)

SUMMARY OF RESULTS									
AVERAGES									
Hour (Local time)	Site (miles)	Station picture (in)	Dry bulb (°F)	Wet bulb (°F)	Rel. hum.	Dew point (°F)	Wind speed (m.p.h.)	Duration	Resultant wind (m.p.h.)
01	6	29.96	69	65	79	62	9.2	24	6.1
04	7	29.97	69	64	83	62	8.2	24	4.7
07	7	29.99	71	66	76	63	9.9	26	4.8
10	5	29.99	78	68	62	63	11.5	18	4.6
13	6	29.96	80	68	56	62	13.7	17	4.2
16	6	29.94	79	68	56	61	13.7	19	8.3
19	7	29.95	74	66	67	62	11.5	20	7.8
22	6	29.97	71	66	77	63	9.4	22	6.8

William H. Haggard
Director, National Climatic Center

OBSERVATIONS AT 3-HOUR INTERVALS

[illegible]

NOTES

CEILING COLUMN -

UNL indicates an unlimited ceiling.

WEATHER COLUMN

*	Tornado
T	Thundershower
O	Squall
R	Rain
RW	Rain showers
ZR	Freezing rain
I	Drizzle
ZL	Freezing drizzle
S	Snow
SP	Snow pellets
IC	Ice crystals
SW	Snow showers
SG	Snow grains
IP	Ice pellets
A	Hail
F	Fog
IF	Ice fog
GF	Ground fog
BD	Blowing dust
BN	Blowing sand
BS	Blowing snow
BY	Blowing spray
K	Smoke
H	Haze
D	Dust

WIND COLUMNS—

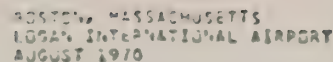
Directions are those from which the wind blows, indicated in tens of degrees from true South; i. e., 10 for East, 18 for South, 27 for West. Entry of 00 in the direction column indicates calm.

Speed is expressed in knots
multiply by 1.15 to convert
to miles per hour.

ADDITIONAL DATA
Other observational data contained in records on file can be furnished at cost via microfilm, microfiche or paper copies of the original records. Inquiries as to availability and costs should be addressed to: Director, National Climatic Center, Federal Building, Asheville, N. C. 28604

STATION: BOSTON MASS

YEAR & MONTH: 70 07



[illegible]

NOTES

CHUNG COLUMNS—

LIM. indicates an unlimited ceiling.

WEATHER COLUMN...

T	Tornado
T	Thin layer storm
R	Squall
R	Rain
RW	Rain showers
ZR	Freezing rain
I	Droizzle
ZI	Freezing droizzle
S	Snow
SP	Snow pellets
H	Ice crystals
SW	Snow showers
G	Snow grains
IP	Ice pellets
A	Hail
F	Fog
H	Ice fog
U	Ground fog
HD	Blowing dust
HS	Blowing sand
HS	Blowing snow
HY	Blowing spray
K	Smoke
H	Haze
D	Dust

WIND COLUMNS

Directions are those from which the wind blows, indicated in tens of degrees from true North; i. e., 09 for East, 18 for South, 27 for West. Entry of 00 in the direction column indicates calm.

Speed is expressed in km/h
multiply by 1.15 to convert
to miles per hour.

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STATION: BOSTON MASS

YEAR & MONTH: 70 01

Latitude 42° 22' N		Longitude 71° 02' W		Elevation (ground) 15 ft		Standard time used: EASTERN																									
Temperature (°F)								Weather types on dates of occurrence		Snow, ice pellets or ice on ground at 07AM (in.)		Precipitation		Avg. station pressure (in.)		Wind			Sunshine		Sky cover (Tenths)										
Date	Maximum	Minimum	Average	Departure from normal	Average dew point	Degree days (Base 65°)		1 Fog	2 Heavy fog or ice pellets	3 Thunderstorm	4 Ice pellets	5 Hail	6 Glaze	7 Duststorm	8 Smoke, Haze	9 Blowing snow	10 Water equivalent (in.)	11 Snow, ice pellets (in.)	12 Elev. 29 feet m.s.l.	13 Resultant direction	14 Resultant speed (m.p.h.)	15 Average speed (m.p.h.)	Fastest mile		18 Hours and tenths	19 Percent of possible	20 Sunrise to sunset	21 Midnight to midnight	22 Date		
						7A	7B																Speed (m.p.h.)	Direction							
1	72	55	64	-4	37	1	0												0.29.97	30	16.1	16.4	25	NW	11.6	88	2	1	1		
2	75	55	65	-3	39	1	0												0.30.02	30	11.6	13.2	22	NW	13.1	100	2	1	2		
3	73	55	64	-4	34	1	0										.04		0.30.04	15	6.9	8.5	16	SW	6.6	51	9	8	3		
4	84	65	75	8	68	0	10	1									.12		0.29.61	23	15.6	17.4	24	SW	3.9	36	9	7	4		
5	84	66	75	8	60	0	10												0.29.65	28	14.2	14.7	19	NA	3.0	69	7	5	5		
6	75	59	67	0	50	0	2												0.29.84	32	14.2	16.1	25	NW	9.5	73	6	5	6		
7	64	58	61	-6	51	4	0												0.30.08	03	7.8	9.8	16	E	0.4	3	10	10	7		
8	64	54	59	-8	52	4	0												0.30.11	05	7.0	9.4	15	E	3.8	30	8	7	8		
9	64	54	59	-8	56	4	0	1									.21		0.30.11	17	6.6	7.1	14	SW	0.0	0	10	9	9		
10	76	60	68	2	65	0	3	1									.07		0.29.97	20	11.9	12.2	17	SW	3.7	29	10	10	10		
11	76	61	69	3	50	0	4												0.30.00	30	12.9	14.0	20	NW	11.5	91	8	6	11		
12	73	55	64	-2	49	1	0												0.30.19	13	3.8	9.5	15	SE	12.7	100	0	0	12		
13	79	53	66	0	53	0	1												0.30.11	24	10.2	10.6	10	W	11.5	91	6	6	13		
14	69	52	61	-5	50	4	0	1									.03		0.30.26	03	12.0	12.4	21	NE	0.0	0	10	10	14		
15	57	52	55	-11	52	10	0	1									.64		0.30.25	08	10.4	11.8	17	E	0.0	0	10	10	15		
16	81	53	67	2	58	0	2	1									.39		0.30.07	28	5.5	10.1	25	NW	5.2	41	7	8	16		
17	66	54	60	-5	47	5	0												0.30.24	07	2.4	12.8	16	NW	12.1	98	4	5	17		
18	68	58	63	-2	60	2	0	1	3								.62		0.29.96	19	7.1	8.9	17	S	0.0	0	10	10	18		
19	74	57	66	1	53	0	1	1	3										0.29.99	32	13.1	13.5	22	N	12.3	100	0	2	19		
20	77	55	66	1	54	0	1												0.30.16	24	7.9	10.8	17	SW	11.7	95	3	2	20		
21	81	59	70	5	61	0	5	1											0.29.97	23	15.2	15.4	20	SW	11.6	95	2	2	21		
22	91	66	79	15	68	0	14	1											0.29.83	24	13.0	13.4	19	SW	10.3	84	1	4	22		
23	92*	68	80*	16	68	0	15												0.29.90	26	11.3	12.9	18	W	10.9	90	4	4	23		
24	71	62	67	3	59	0	2												0.30.18	07	8.3	9.2	16	E	10.2	84	2	4	24		
25	88	62	75	11	68	0	10	1											0.30.10	25	13.8	14.0	16	SW	9.5	79	2	5	25		
26	77	64	71	8	64	0	6	1											0.30.05	07	7.1	9.2	14	E	8.0	67	7	8	26		
27	83	56	70	7	64	0	5	1	3								.45		0.29.79	26	7.4	12.2	22	NW	4.3	36	10	10	27		
28	59	53	56	-7	48	9	0												0.29.93	32	3.5	9.2	14	NW	1.4	11	10	10	28		
29	61	50	55	-6	48	9	0	1									.03		0.29.92	34	3.9	8.3	13	N	4.8	41	7	7	29		
30	62	46*	55*	-7	46	10	0	1											0.29.94	23	1.6	6.6	12	S	7.0	59	9	8	30		
Sum		Sum				Total	Total	Number of days		Total		Total		For the month:		Total		%		Sum		Sum									
221.6		171.9				68	91	2.60		0.30.01		27		3.8		11.6		25		NW		216.6		for 185		134					
Avg.		Avg.		Avg.		Dep.	Dep.	Precipitation		Dep.						Date: 10		P. in		in. in											

[illegible]

- * Extreme temperatures for the month. May be the last of more than one occurrence.
- Below zero temperature or negative departure from normal.

♂ $\bar{x} = 70'$ at Alaskan stations.

Also on an earlier date, or dates.

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Resultant wind is the vector sum of wind directions

Figures for directions are tens of degrees from true

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in Col. 17, entries in Col. 16 are fastest observed 1-minute speeds. If the f appears in Col. 17, speeds

1-minute species. If the 7 appears in Col. 17, species are quota.

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Washington, D. C., Nov. 1906.

I certify that this is an official publication of the
National Oceanic and Atmospheric Administration, and

is compiled from records on file at the National Climatic Center, Asheville, North Carolina 28802.

William A. Hammond

William H. Haggard

Director, National Climatic Center

SUMMARY BY HOURS

AVERAGES									Resultant wind	
Hour (Local time)	Sky cover (in tenths)	Station pressure (in)	Dry bulb (°F)	Wet bulb (°F)	Rel. hum.	Temp. (°F)	Wind speed (mi. per hr.)	Direction	Speed (m.p.h.)	
01	6	30.01	62	58	79	55	10.4	27	4.6	
04	6	30.00	61	57	82	55	10.2	29	4.7	
07	7	30.03	62	58	78	54	11.1	25	5.4	
10	6	30.03	68	60	64	55	13.2	28	3.4	
13	6	30.00	70	62	61	55	14.1	27	3.8	
16	6	29.98	70	62	63	55	13.7	26	2.9	
19	6	30.00	66	60	72	56	10.0	23	2.3	
22	6	30.01	64	59	76	55	10.0	26	4.1	

William H. Haggard

Director, National Climatic Center

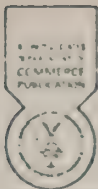
USCOMM — NOAA — ASHEVILLE

425

YEAR & MONTH: 70 09

Speed is expressed in knots; multiply by 1.15 to convert to miles per hour.

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LOCAL CLIMATOLOGICAL DATA

U.S. DEPARTMENT OF COMMERCE

MAURICE H. STANS, Secretary

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

ENVIRONMENTAL DATA SERVICE

BOSTON, MASSACHUSETTS
LOGAN INTERNATIONAL AIRPORT
OCTOBER 1970

Latitude 42° 22' N Longitude 71° 02' W Elevation (ground) 15 ft

Standard time used EASTERN

Date	Temperature (°F)							Weather types on dates of occurrence	Snow, ice pellets or ice on ground at 07AM (in.)	Precipitation		Avg. station pressure (in.)	Wind		Sunshine		Sky cover (Tenths)		Date				
	Maximum	Minimum	Average	Departure from normal	Average dew point	Heating	Cooling			Water equivalent (in.)	Snow, ice pellets (in.)		Resultant direction	Speed (m.p.h.)	Hours and tenths	Percent of possible	Sunrise to sunset	Midnight to midnight					
1	61	52	57	-5	48	8	0	1	0	0	0	29.94	06	2.3	7.5	11	E	2.9	23	8	7	1	
2	63	50	57	-4	51	8	0	1	0	0	0	29.95	13	7.5	9.2	19	SE	3.4	46	6	6	2	
3	74	56	65	3	59	0	0	1	0	.29	0	29.74	22	15.0	21.0	32	W	8.0	69	8	9	3	
4	65	49	57	-3	44	8	0	1	0	.02	0	29.89	27	11.6	12.8	18	NW	7.7	66	6	5	4	
5	62	45	54	-6	39	11	0	1	0	0	0	30.11	31	6.3	9.4	15	NW	9.2	85	4	3	5	
6	61	44	53	-6	43	12	0	1	0	0	0	30.27	19	2.2	8.9	14	SE	11.0	93	0	2	6	
7	73	56	65	6	55	0	0	1	0	0	0	30.24	22	5.3	8.6	13	SW	9.8	83	2	3	7	
8	73	55	63	6	59	0	0	1	0	0	0	30.23	17	2.5	5.9	9	E	9.4	82	7	5	8	
9	59	53	56	-4	58	3	0	2	0	0	0	30.26	09	3.6	4.9	13	E	7.8	69	6	4	9	
10	59	53	57	-1	57	8	0	2	0	0	0	30.30	07	6.9	7.6	10	E	0.0	0	10	10	10	
11	63	57	60	3	57	5	0	1	0	0	0	30.31	12	3.5	5.9	10	SE	0.4	4	10	9	11	
12	72	55	64	7	58	1	0	2	0	0	0	30.20	20	6.8	8.8	14	SW	3.4	48	8	8	12	
13	73	60	67	10	60	0	2	1	0	0	0	30.13	22	3.3	6.9	13	SW	2.8	29	10	9	13	
14	74	61	68	12	61	0	3	1	0	0	0	30.11	23	13.4	13.8	19	SW	4.6	42	8	8	14	
15	76	62	69	13	64	0	4	1	0	.10	0	29.98	21	12.5	13.7	23	SW	2.7	23	9	8	15	
16	67	42	55	0	46	10	0	1	0	.50	0	29.93	33	12.2	16.0	23	NW	0.2	2	10	8	16	
17	46	37	42	-12	27	23	0	1	0	0	0	29.93	32	16.0	16.3	25	NW	4.2	38	7	6	17	
18	61	36	49	-5	34	16	0	0	0	0	0	29.98	27	17.5	18.0	29	W	10.7	97	4	2	18	
19	55	43	49	-5	24	16	0	0	0	0	0	30.38	33	9.9	11.1	21	N	10.9	100	1	1	19	
20	56	36	46	-7	34	19	0	0	0	0	0	30.59	14	2.0	9.2	15	E	10.9	100	1	3	20	
21	57	41	49	-4	46	16	0	0	0	0	0	30.44	13	5.1	6.8	13	SE	4.5	41	10	10	21	
22	59	52	56	3	53	9	0	1	0	.02	0	30.29	10	10.8	11.4	14	SE	0.0	0	10	10	22	
23	59	53	57	3	57	8	0	1	0	1.62	0	29.98	09	10.7	12.9	18	NW	0.0	0	10	10	23	
24	69	57	63	11	56	2	0	1	0	0	0	29.91	32	12.8	13.1	22	NW	3.4	32	9	9	24	
25	57	51	54	3	48	11	0	1	0	.02	0	30.12	05	12.6	13.1	17	E	0.0	0	10	10	25	
26	53	46	50	-1	45	15	0	1	0	.06	0	30.24	05	19.6	20.1	24	NE	0.0	0	10	10	26	
27	46	36	41	-10	32	24	0	0	0	0	0	30.43	02	14.9	16.0	23	NE	2.4	23	9	6	27	
28	54	34	44	-6	30	21	0	0	0	0	0	30.39	31	2.8	6.2	12	NW	10.4	99	0	0	28	
29	53	37	45	-5	34	20	0	0	0	0	0	30.44	05	6.5	10.2	17	E	10.5	100	0	0	29	
30	53	36	45	-5	35	20	0	0	0	0	0	30.52	29	.3	6.8	10	SE	10.3	99	1	0	30	
31	54	36	45	-5	37	20	0	1	0	0	0	30.47	09	2.1	6.0	10	E	9.9	93	9	7	31	
Sum		1917	Sum	1488		Total	314	Total	9	Total	2.63	Total	30.18	33	9	10.9	32	W	175.4	for	203	188	
Avg.		61.8	Avg.		48.0	Avg.		54.9	Dep.		-0.1	Dep.		-2	Season to date		Total	302	Total	810	Dep.		-3
Number of days		Maximum Temp.	Minimum Temp.	-50	32	-32	-0	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.
Number of days		Maximum Temp.	Minimum Temp.	-50	32	-32	-0	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.
Number of days		Maximum Temp.	Minimum Temp.	-50	32	-32	-0	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.
Number of days		Maximum Temp.	Minimum Temp.	-50	32	-32	-0	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.
Number of days		Maximum Temp.	Minimum Temp.	-50	32	-32	-0	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.
Number of days		Maximum Temp.	Minimum Temp.	-50	32	-32	-0	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.
Number of days		Maximum Temp.	Minimum Temp.	-50	32	-32	-0	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.
Number of days		Maximum Temp.	Minimum Temp.	-50	32	-32	-0	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.
Number of days		Maximum Temp.	Minimum Temp.	-50	32	-32	-0	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.
Number of days		Maximum Temp.	Minimum Temp.	-50	32	-32	-0	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.
Number of days		Maximum Temp.	Minimum Temp.	-50	32	-32	-0	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.
Number of days		Maximum Temp.	Minimum Temp.	-50	32	-32	-0	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.
Number of days		Maximum Temp.	Minimum Temp.	-50	32	-32	-0	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.
Number of days		Maximum Temp.	Minimum Temp.	-50	32	-32	-0	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.
Number of days		Maximum Temp.	Minimum Temp.	-50	32	-32	-0	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.
Number of days		Maximum Temp.	Minimum Temp.	-50	32	-32	-0	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.
Number of days		Maximum Temp.	Minimum Temp.	-50	32	-32	-0	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.
Number of days		Maximum Temp.	Minimum Temp.	-50	32	-32	-0	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.
Number of days		Maximum Temp.	Minimum Temp.	-50	32	-32	-0	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.
Number of days		Maximum Temp.	Minimum Temp.	-50	32	-32	-0	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.
Number of days		Maximum Temp.	Minimum Temp.	-50	32	-32	-0	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.
Number of days		Maximum Temp.	Minimum Temp.	-50	32	-32	-0	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.
Number of days		Maximum Temp.	Minimum Temp.	-50	32	-32	-0	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.
Number of days		Maximum Temp.	Minimum Temp.	-50	32	-32	-0	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.
Number of days		Maximum Temp.	Minimum Temp.	-50	32	-32	-0	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.
Number of days		Maximum Temp.	Minimum Temp.	-50	32	-32	-0	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.
Number of days		Maximum Temp.	Minimum Temp.	-50	32	-32	-0	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.
Number of days		Maximum Temp.	Minimum Temp.	-50	32	-32	-0	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.
Number of days		Maximum Temp.	Minimum Temp.	-50	32	-32	-0	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.
Number of days		Maximum Temp.	Minimum Temp.	-50	32	-32	-0	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.
Number of days		Maximum Temp.	Minimum Temp.	-50	32	-32	-0	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.
Number of days		Maximum Temp.	Minimum Temp.	-50	32	-32	-0	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.
Number of days		Maximum Temp.	Minimum Temp.	-50	32	-32	-0	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.
Number of days		Maximum Temp.	Minimum Temp.	-50	32	-32	-0	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.
Number of days		Maximum Temp.	Minimum Temp.	-50	32	-32	-0	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.
Number of days		Maximum Temp.	Minimum Temp.	-50	32	-32	-0	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.	Dep.
Number of days		Maximum																					

OBSERVATIONS AT 3-HOUR INTERVALS

STATION- BOSTON MASS

YEAR & MONTH: 70 10

CHUNG COLUMN

UNL indicates an unlimited ceiling.

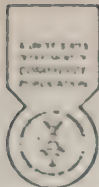
WEATHER COLUMN—

- | | |
|----|------------------|
| T | Tornado |
| TJ | Thunderstorm |
| R | Rain |
| RW | Rain showers |
| ZH | Freezing rain |
| I | Drizzle |
| ZL | Freezing drizzle |
| S | Snow |
| SP | Snow pellets |
| IC | Ice crystals |
| SW | Snow showers |
| SG | Snow grains |
| IP | Ice pellets |
| A | Hail |
| F | Fog |
| IF | Ice fog |
| GF | Ground fog |
| BD | Blowing dust |
| BS | Blowing sand |
| BS | Blowing snow |
| BY | Blowing spray |
| K | Smoke |
| H | Haze |
| D | Dust |

WIND COILS

Directions are those from which the wind blows, indicated in tens of degrees from true South, i. e., 09 for East, 18 for South, 27 for West. Entry of (0) in the direction column indicates calm.

Speed is expressed in knots; multiply by 1.15 to convert to miles per hour.



LOCAL CLIMATOLOGICAL DATA

U.S. DEPARTMENT OF COMMERCE

MAURICE H. STANS, Secretary

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

ENVIRONMENTAL DATA SERVICE

BOSTON, MASSACHUSETTS
LOGAN INTERNATIONAL AIRPORT
NOVEMBER 1970

Latitude 42° 22' N Longitude 71° 02' W Elevation (ground) 15 ft

Standard time used: EASTERN

Date	Temperature (°F)						Degree days (Base 65°)		Weather types on dates of occurrence 1 Fog 2 Heavy fog 3 Thunderstorm 4 Ice pellets 5 Hail 6 Glaze 7 Duststorm 8 Smoke, Haze 9 Blowing snow	Snow, ice pellets or ice on ground at 07AM (In.)	Precipitation		Avg. station pressure (In.) Elev. feet m.s.l.	Wind			Sunshine		Sky cover (Tenths)		Date	
	Maximum	Minimum	Average	Departure from normal	Average dew point	Heating	Cooling	Water equivalent (In.)			Snow, ice pellets (In.)	Resultant direction		Resultant speed (m.p.h.)	Average speed (m.p.h.)	Fastest mile		Hours and tenths	Percent of possible	Summed to sunset		Midnight to next day
																Speed (m.p.h.)	Direction					
1	2	3	4	5	6	7A	7B	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
1	57	43	50	1	45	15	0		0	0		30.31	18	3.5	7.3	10	E	7.6	13	9	9	1
2	54	44	49	0	48	16	0	1	0	.96		30.08	04	9.1	10.4	23	N	0.0	0	10	10	2
3	57	45	51	2	44	14	0	1	0	.27		29.94	06	5.9	12.2	19	N	6.3	61	7	8	3
4	54	47	51	2	46	14	0		0	.28		29.77	10	6.9	9.1	20	E	1.6	16	10	10	4
5	49	42	46	-2	42	19	0	1	0	.36		29.20	35	9.3	17.0	27	NW	0.7	6	10	9	5
6	51	41	46	-2	28	19	0		0	0		29.73	28	13.8	16.3	20	NW	10.1	100	0	1	6
7	63	41	52	4	40	13	0		0	0		29.95	23	13.1	14.2	25	SW	9.2	91	3	3	7
8	50	38	44	-3	36	21	0		0	0		30.29	02	8.5	11.1	17	NE	7.7	76	4	2	8
9	49	36	43	-4	36	22	0		0	0		30.46	06	6.0	10.1	12	SE	9.7	97	4	4	9
10	54	46	50	3	48	15	0	2	0	T		30.39	11	9.0	9.2	14	SE	0.0	0	10	10	10
11	59	48	54	3	51	11	0	1	0	T		30.27	09	7.1	8.3	12	SE	4.8	49	10	10	11
12	53	47	50	4	47	15	0	1	0	T		30.07	08	10.6	11.1	15	E	4.7	48	10	10	12
13	49	44	47	1	45	18	0	1	0	.62		29.79	03	14.5	15.2	24	NE	0.2	2	10	10	13
14	48	44	46	0	43	19	0	1	0	.13		29.91	02	16.1	17.4	23	NE	3.0	30	10	10	14
15	44	41	44	-1	43	21	0	1	0	.61		29.81	04	12.5	15.0	19	E	0.1	1	10	10	15
16	45	36	41	-4	36	24	0	1	0	.01		29.77	30	13.7	14.5	18	NW	0.2	2	10	7	16
17	49	35	42	-3	29	23	0		0	0		30.08	28	9.7	10.1	14	W	9.2	95	0	1	17
18	47	34	41	-3	35	24	0		0	T		30.23	05	4.8	10.1	17	E	3.4	35	8	7	18
19	47	44	46	2	43	19	0	1	0	.06		30.20	11	14.2	14.5	20	SE	0.0	0	10	10	19
20	56	43	51	7	47	14	0	1	0	.27		30.05	12	13.2	14.7	23	SE	0.3	3	10	10	20
21	56	42	49	5	37	16	0		0	T		29.78	27	20.5	22.9	40	W	8.8	92	4	4	21
22	56	38	47	4	36	18	0		0	0		30.00	20	12.7	13.7	30	SW	4.8	50	9	8	22
23	56	33	45	2	40	20	0		0	.07		29.55	26	13.6	17.4	33	SW	0.0	0	10	10	23
24	37	28	33	-10	14	32	0		0	0		29.77	31	13.3	14.5	17	NW	8.1	85	1	3	24
25	35	26	31	-11	14	34	0		0	0		30.21	32	9.4	10.2	15	NW	8.3	88	1	2	25
26	40	25	33	-9	21	32	0		0	0		30.32	14	1.1	6.0	13	SE	8.1	86	7	3	26
27	48	35	42	0	34	23	0		0	0		30.17	20	3.1	6.6	13	SW	1.7	13	10	8	27
28	47	39	43	2	40	22	0	1	0	.10		30.18	01	3.7	5.8	16	N	0.5	5	10	9	28
29	44	36	40	-1	37	25	0	1	0	.02		30.28	36	8.5	11.1	16	NE	0.0	0	10	9	29
30	50	40	45	5	41	20	0	1	0	.05		30.06	31	4.7	10.6	18	N	0.5	5	10	9	30

Sum	Sum					Total	Total					Total	Total	For the month:				Total		Sum	Sum		
1508	1143					598	0	Number of days				4.09	T	30.02	36	2.3	12.2	40	W	119.6	Fr	227	2.5
Avg	Avg							Precipitation				Dep.							Date: 21				
50.2	39.4							= .01 inch	15			0.16											
Season to date						Total	Total																
Number of days						990	810																
Maximum Temp						90	32																
Minimum Temp						32	0																
Precipitation						0	0																
Snow, ice pellets						0	0																
Thunderstorms						0	0																
Heavy fog						X	1																
Clear						5	5																
Partly cloudy						5	5																
Cloudy						20	20																

HOURLY PRECIPITATION (Water equivalent in inches)

Date	A. M. Hour ending at												P. M. Hour ending at												Date
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	
1																									1
2																									2
3	.19	.08	T				T	T			.01	T	T	T			.01	.01	.09	.13	.26	.19	.12	.14	3
4																									4
5	.22	.05	T	T	T	T	.03	.02	T	T		T	.03	T		T	.01	T					.11	.17	5
6																									6
7																									7
8																									8
9																									9
10																									10
11	T		T	.01	.02	T	.20	.02	T	.03	T	T	T	T	T		.01	.01	.02	.02	.02	.07	.20	.13	11
12																								T	12
13	T						T	T	T	T	T	T	T	T	T		.01	.01	.02	.02	.02	.07	.20	.13	13
14	.07	.01	.01	.02	.02	T	T	T	T	T	T	T	.18	.02	T	T	T	T	T	T	T	T	T	T	14
15	T	T	T	.05	.05	.01	.03	.04	.07	.05	.05	.05	T	T	T										15
16				T	T	T	.01						T	T	T										16
17																									17
18																									18
19													T	T	T					.03	.02	.01	T	T	19
20	.01	T											T	T	T		T	T	T	T			.10	.16	20
21	T	T																							21
22																									22
23	T	T					.03	.02	T	T							T	T	.01	.01	T				23
24																									24
25																									25
26																									26
27																									27
28																									28
29													T	T	T		.01	T	.04	.05	T	.01	T		29
30		T		T	.02	.01	T	.02	T				T	T	T		T	.01	T						30

* Extreme temperatures for the month. May be the last of more than one occurrence.
- Below zero temperature or negative departure from normal.
T = 70° at Alaskan stations.
+ Also on an earlier date, or dates.
X Heavy fog restricts visibility to 1/4 mile or less.
In the Hourly Precipitation table and in columns 9, 10, and 11 indicates an amount too small to measure.

The season for degree days begins with July for heating and with January for cooling.
Data in columns 6, 12, 13, 14, and 15 are based on 8 observations per day at 3-hour intervals.

Wind directions are those from which the wind blows. Resultant wind is the vector sum of wind directions and speeds divided by the number of observations. Figures for directions are tens of degrees from true North; e.g., 09 = East, 18 = South, 27 = West, 36 = North, and 0

OBSERVATIONS AT 3-HOUR INTERVALS

[illegible]

NOTES

CEILING COLUMN -

L.N. indicates an unlimited ceiling.

WEATHER COLUMN—

T	Tornado
O	Thunderstorm
R	Squall
RW	Rain
ZR	Rain showers
I	Freezing rain
ZL	Drizzle
SP	Freezing drizzle
IC	Snow
SW	Snow pellets
SG	Ice crystals
IP	Snow showers
A	Snow grains
F	Ice pellets
HF	Hail
Gf	Fog
BD	Ice fog
BN	Ground fog
BS	Blowing dust
BY	Blowing sand
K	Blowing snow
H	Blowing spray
D	Smoke
	Haze
	Dust

WIND COLUMNS -

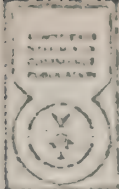
Directions are those from which the wind blows, indicated in tens of degrees from true North; i. e., 09 for East, 18 for South, 27 for West. Entry of (a) in the direction column indicates calm.

Speed is expressed in knots; multiply by 1.15 to convert to miles per hour.

ADDITIONAL DATA
Other observational data contained in records on file can be furnished at cost via microfilm, microfiche, or paper copies of the original records. Inquiries as to availability and costs should be addressed to:
Director, National Climatic Center, Federal Building, Asheville, N. C. 28401

STATION: BOSTON MASS

YEAR & MONTH: 70 11



LOCAL CLIMATOLOGICAL DATA

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
ENVIRONMENTAL DATA SERVICE

BOSTON, MASSACHUSETTS
LOGAN INTERNATIONAL AIRPORT
DECEMBER 1970

Latitude 42° 22' N Longitude 71° 02' W Elevation (ground) 15 ft Standard time used EASTERN WRA# 14739

Date	Temperature °F							Weather types on dates of occurrence 1 Fog 2 Heavy fog 3 Thunderstorm 4 Ice pellets 5 Hail 6 Glaze 7 Duststorm 8 Smoke, haze 9 Blowing snow	Snow ice pellets or ice on ground at 07AM In	Precipitation		Avg station pressure In. Elev. feet msl	Wind				Sunshine		Sky cover Tenths		Date		
	Maximum	Minimum	Average	Departure from normal	Average dew point	Heating	Cooling			Water equivalent In.	Snow, ice pellets In.		Resultant speed m.p.h.	Average speed m.p.h.	Speed m.p.h.	Direction	Hours and tenths	Percent of possible	Sunrise to sunset	Midnight to midnight			
1	2	3	4	5	6	7A	7B	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
1	44	34	39	-1	33	26	0		0	0	0	30.28	04	2.3	10.1	11	NW	4.1	44	9	7	1	
2	59	40	50	11	43	15	0	8	0	0	0	30.04	23	15.3	16.5	27	SW	6.5	70	4	4	2	
3	57	42	50	12	22	15	0		0	.03	0	30.06	25	12.2	12.8	18	W	6.4	69	9	9	3	
4	54	24	39	1	39	26	0	1 3 5	0	.53	0	29.47	30	7.0	17.5	33	NW	1.3	14	10	8	4	
5	34	23	29	-8	13	36	0		0	0	0	29.91	29	12.8	15.1	27	NW	6.0	65	5	5	5	
6	34	24	29	-8	22	36	0	1	1	.07	.7	29.51	30	17.6	21.0	34	NW	5.5	60	10	9	6	
7	30	16	23	-13	6	42	0		0	0	0	30.00	32	20.4	20.9	27	NW	9.2	100	1	1	7	
8	24	15	20	-16	4	45	0		0	0	0	30.35	33	9.2	10.4	17	NW	3.8	41	10	9	8	
9	36	21	29	-7	26	36	0	1 6 8	1	.24	1.6	30.11	32	4.0	6.0	13	W	0.0	0	10	10	9	
10	43	24	34	-1	27	31	0	1 8	0	0	0	29.99	29	17.4	20.0	25	NW	8.1	88	2	2	10	
11	31	20	26	-9	16	39	0		0	.16	2.0	30.17	33	8.7	9.4	18	NW	3.8	42	9	7	11	
12	33	22	28	-6	24	37	0	1 8	0	.39	2.8	30.10	32	15.5	17.5	19	NE	0.0	0	10	10	12	
13	30	22	26	-8	24	39	0	1 4 6 8	5	.30	2.2	29.87	34	13.0	14.4	18	N	0.0	0	10	10	13	
14	30	22	26	-8	24	39	0	1	5	0	0	29.93	35	7.5	8.2	16	N	1.4	15	10	10	14	
15	27	18	23	-10	16	42	0		4	0	0	30.25	34	9.5	9.9	13	NW	8.8	97	1	3	15	
16	33	15	24	-9	19	41	0	1 4 6 9	3	.01	.1	30.48	05	7.1	14.1	30	E	2.4	26	9	9	16	
17	42	30	36	3	35	29	0		1	2.82	3.8	29.74	05	21.6	29.3	40	E	0.0	0	10	10	17	
18	35	29	32	0	23	33	0		1	0	0	29.84	30	18.6	18.7	30	NW	8.8	97	2	3	18	
19	46	27	37	5	29	28	0	8	1	0	0	29.74	26	11.8	13.4	31	W	1.5	16	9	7	19	
20	42	30	36	3	35	29	0		1	0	0	29.90	29	19.7	20.0	29	NW	8.1	90	3	4	20	
21	31	16	24	-7	13	41	0		0	0	0	30.18	31	8.6	12.7	18	N	2.1	23	8	6	21	
22	31	13	22	-9	11	43	0	1 4	0	.67	4.5	30.09	03	8.6	15.4	25	SE	0.0	0	10	7	22	
23	34	13	24	-7	13	41	0	1 8	4	.73	6.9	30.00	33	13.5	13.7	20	E	0.0	0	10	10	23	
24	33	20	29	-1	27	36	0	1 4 6	6	.82	1.3	29.54	33	13.1	24.2	33	NW	0.0	0	10	9	24	
25	29	19	24	-6	17	41	0		6	0	0	29.75	31	8.1	9.8	20	NW	6.1	67	10	7	25	
26	29	20	25	-5	18	40	0	9	6	.15	2.0	29.35	33	19.6	22.3	27	NW	2.8	30	10	7	26	
27	30	18	24	-6	13	41	0		6	0	0	29.43	28	19.9	20.1	27	A	8.5	93	9	5	27	
28	28	20	24	-6	11	41	0		6	0	0	29.59	29	19.9	20.3	24	NW	9.1	100	7	6	28	
29	28	17	23	-7	10	42	0		5	0	0	29.78	31	16.2	16.4	20	NW	8.6	94	6	7	29	
30	26	16	22	-8	8	43	0		4	0	0	29.77	30	19.4	19.7	26	NW	9.1	100	4	4	30	
31	32	18	25	-5	11	40	0		4	0	0	29.93	30	11.8	13.5	22	NW	9.1	100	6	5	31	
Sum		Sum		Total		Total		Number of days		Total		For the month		Total		Total		Sum		Sum		Sum	
1301		638		1113		0		Precipitation		6.92		27.9		29.91		31		10.2		15.9		40	
Avg.		Avg.		Avg.		Avg.		Precipitation		.01 inch		.01 inch		.01 inch		.01 inch		.01 inch		.01 inch		.01 inch	
35.5		22.2		28.9		-4.4		20		130		283.4		50		7.5		6.8		233		2.2	
Season to date		Season to date		Season to date		Season to date		Season to date		Season to date		Season to date		Season to date		Season to date		Season to date		Season to date		Season to date	
Maximum Temp.		Maximum Temp.		Maximum Temp.		Maximum Temp.		Maximum Temp.		Maximum Temp.		Maximum Temp.		Maximum Temp.		Maximum Temp.		Maximum Temp.		Maximum Temp.		Maximum Temp.	
2093		2093		2093		2093		2093		2093		2093		2093		2093		2093		2093		2093	
Minimum Temp.		Minimum Temp.		Minimum Temp.		Minimum Temp.		Minimum Temp.		Minimum Temp.		Minimum Temp.		Minimum Temp.		Minimum Temp.		Minimum Temp.		Minimum Temp.		Minimum Temp.	
-7		-7		-7		-7		-7		-7		-7		-7		-7		-7		-7		-7	
Heavy fog X		Heavy fog X		Heavy fog X		Heavy fog X		Heavy fog X		Heavy fog X		Heavy fog X		Heavy fog X		Heavy fog X		Heavy fog X		Heavy fog X		Heavy fog X	
Clear 5		Partly cloudy 6		Cloudy 20		Cloudy 20		Cloudy 20		Cloudy 20		Cloudy 20		Cloudy 20		Cloudy 20		Cloudy 20		Cloudy 20		Cloudy 20	

HOURLY PRECIPITATION (Water equivalent in inches)

Date	A. M. Hour ending at												P. M. Hour ending at												Date	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12		
1																									1	
2																									2	
3																									3	
4	.06	.12	.06	T	T	T	.05	.15	.03	.06	T	T	T			T			T	T			T	.03	4	
5																									5	
6	T	.01	.03	.01	.01	T	T	T					T	T	T	T	.01	T						T	6	
7																									7	
8																									8	
9	.02	.02	.02	.02	.01	.02	.05	.03	T	T				T	T		.01	.02	.02	T			T		9	
10																									10	
11																									11	
12	.07	.01	.01	.04	.02	.03	.01	T	T	T	T	.01	T		T	.01	T	.02	.05	.02	T	.05	.05	.06	12	
13	.03	.04	.03	.01	.04	T	T	T	T	T	T		T	T	T	T	T	.05	.05	.03	.02	T	T	.04	13	
14	T						T		T	T	T		T	T	T	T	T	T	T	T			T		14	
15																									15	
16																									16	
17	.06	.06	.12	.15	.12	.18	.27	.15	.23	.25	.35	.35	.16	.15	.05	.14	.02	T	T	.01	T	T	T	.01	17	
18	T																								18	
19																									19	
20																									20	
21																									21	
22																									22	
23	.03	.01	T	T		T	T	T	.01	.01	T	.02	T	.05	.04	.03	.01	.03	.09	.06	.13	.08	.06	.04	.03	23
24	.02	.05	.03	.04	.12	.21	.10	.11	.01	.01	.02	.02	.01	.03	.02	.02	T	T	T			T	T	T		24
25																									25	
26	T	T	T	T	.05	.04	.02	.03	.01	T	T	T													26	
27																									27	
28																									28	
29																									29	
30																									30	

[illegible]

40119

011156, 001148

1 % indicates an unlimited ceiling.

WEATHER COLUMN—

T	Tomato
T	Thunderstorm
U	Uppail
U	Uran
RW	Rain Showers
ZR	Freezing rain
I	Drizzle
ZL	Freezing drizzle
S	Snow
SP	Snow pellets
IC	Ice crystals
SN	Snow showers
SG	Snow grains
IP	Ice pellets
A	Hail
F	Fog
I	Ice fog
CI	Ground fog
HD	Blowing dust
BN	Blowing sand
BS	Blowing snow
BY	Blowing spray
K	Smoke
H	Haze
D	Dust

WIND COLUMNS:

Directions are those from which the wind blows, indicated in terms of degrees from true South, i. e., 09 for East, 18 for South, 27 for West. Entry of 00 in the direction column indicates calm.

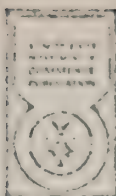
Speed is expressed in knots, multiply by 1.15 to convert to miles per hour.

ADDITIONAL DATA

ADDITIONAL DATA
Other observational data contained in records on file can be furnished at cost via microfilm, microfiche, or paper copies of the original records. Inquiries as to availability and costs should be addressed to: Director, National Climatic Center, Federal Building, Asheville, North Carolina 28601.

STATION- BOSTON MASS

YEAR & MONTH: 70 12



LOCAL CLIMATOLOGICAL DATA

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
ENVIRONMENTAL DATA SERVICE

BOSTON, MASSACHUSETTS
LOGAN INTERNATIONAL AIRPORT
JANUARY 1971

Latitude 42° 22' N Longitude 71° 02' W Elevation (ground) 15 ft Standard time used EASTERN GRN 014739

Date	Temperature °F						Weather types on dates of occurrence 1 Fog 2 Heavy fog x 3 Thunderstorm 4 Ice pellets 5 Hail 6 Glaze 7 Duststorm 8 Smoke, Haze 9 Blowing snow	Snow, ice pellets or ice on ground at 07AM In.	Precipitation Water equiva- lent In.	Snow, ice pellets In.	Avg. station pressure In. Elev. 29 feet m.s.l.	Wind			Sunshine		Sky cover		Date			
	Maximum	Minimum	Average	Departure from normal	Average dew point	Degree days Base 65						Fastest mile	Hours and tenths	Percent of possible	Sunrise to sunset	Midnight to midnight						
						Heating											Cooling	Speed m.p.h.		Direction		
1	2	3	4	5	6	7A	7B	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
1	34	23	29	-1	23	36	0	1	4	.44	4.9	29.69	36	15.8	17.8	25	NE	0.0	0	10	10	1
2	36	26	31	1	22	34	0		8	T	T	29.89	29	12.1	13.2	18	W	8.9	97	2	3	2
3	41	28	35	5	23	30	0		6	0	0	30.10	28	15.3	16.3	23	W	5.5	60	7	3	3
4	34	24	29	-1	25	36	0	1	4	.30	T	30.17	11	2.3	6.8	16	SE	0.0	0	10	8	4
5	46	31	39	9	33	26	0	2	4	.07	0	29.75	29	0.7	10.6	22	W	1.7	19	10	7	5
6	33	23	28	-2	17	37	0	3	3	0	0	30.03	27	20.3	21.3	24	W	9.2	100	4	2	6
7	29	19	24	-6	10	41	0	2	2	0	0	30.03	28	20.7	21.0	28	W	8.9	95	1	1	7
8	23	13	18	-12	1	47	0	2	0	0	0	30.18	31	17.8	19.0	26	NW	9.0	97	3	4	8
9	28	12	20	-10	9	45	0	2	2	.02	T	30.17	36	8.0	9.8	13	N	6.9	75	5	8	9
10	35	18	27	-3	21	38	0		8	T	T	30.02	24	4.2	7.1	15	SW	2.1	22	10	9	10
11	39	30	35	5	25	30	0		0	T	T	29.99	26	0.4	8.8	17	SW	8.8	94	7	8	11
12	36	13	25	-5	17	40	0	1	1	.01	T	30.02	30	14.9	19.6	28	NW	6.3	67	6	5	12
13	20	5	13	-17	-9	52	0	1	1	0	0	30.44	31	12.6	13.4	21	N	9.4	100	0	3	13
14	20	14	17	-13	10	48	0	1	4	.30	T	30.09	33	7.5	8.5	17	NW	0.0	0	10	9	14
15	35	16	25	-4	20	39	0	1	0	T	T	29.88	30	8.0	11.4	22	N	1.8	19	10	7	15
16	22	7	15	-15	-5	50	0	3	3	T	T	29.89	31	19.8	20.3	29	N	9.1	96	0	1	16
17	18	4	11	-19	-8	54	0	3	0	0	0	29.82	29	15.5	15.7	19	W	9.4	99	1	1	17
18	19	8	14	-16	-4	51	0	3	0	0	0	29.70	29	12.7	15.0	10	W	9.4	99	0	2	18
19	13	2	8	-22	-11	57	0	3	0	0	0	29.63	31	10.1	11.2	17	W	9.6	100	0	0	19
20	17	2	10	-20	-9	55	0	3	1	T	T	29.87	32	17.7	17.8	26	NW	8.8	92	2	3	20
21	33	10	22	-8	8	43	0	2	2	.01	T	29.93	26	12.1	14.7	24	SW	4.8	49	10	7	21
22	38	25	32	2	22	33	0	2	0	0	0	29.77	27	16.9	17.7	34	W	5.5	57	7	6	22
23	41	25	33	3	23	32	0		8	.16	T	29.74	27	0.2	16.5	29	W	3.4	33	7	5	23
24	39	24	32	2	16	33	0	2	2	T	T	30.08	25	14.1	14.7	19	W	9.2	95	6	6	24
25	43	29	35	6	30	29	0	1	0	.03	T	29.97	21	10.2	11.9	17	SW	7.3	75	7	9	25
26	43	24	34	4	34	31	0	1	4	.38	T	29.32	18	10.8	19.1	34	NW	0.0	0	10	10	26
27	25	8	17	-13	-3	48	0	1	0	.04	T	29.18	27	29.0	30.5	26	NW	8.2	84	7	5	27
28	21	2	12	-18	-6	53	0	1	1	0	0	29.63	27	20.1	21.1	28	NW	9.3	94	2	1	28
29	24	14	19	-11	3	46	0	1	1	T	T	29.82	23	15.5	17.1	24	SW	9.9	100	2	4	29
30	45	24	35	5	23	30	0	1	1	.12	T	29.29	24	18.8	23.3	34	W	7.8	78	9	9	30
31	27	12	20	-10	3	45	0		T	T	T	29.65	30	14.3	14.7	18	NW	3.9	39	9	6	31
Sum		Sum				Total	Total		Total	Total	Total	For the month:				Total	%	Sum	Sum			
957		515				1259	0		Number of days	1.85	12.0	29.87	28	11.1	15.7	26	NW	194.1	for	174	154	
Avg.		Avg.				Avg.	Dep.		Precipitation	Dep.			Date: 27				Possible	month	Avg.	Avg.		
33.9		16.6				23.8	-6.1		12	-2.06							294.2	66	5.6	5.3		
						Season to date			Snow, ice pellets				Greatest in 24 hours and dates				Greatest depth on ground of snow,					
						Total	Total		Thunderstorms	0			Precipitation				Snow, ice pellets					
						3362	0		Heavy fog X	1			1				4.9					
						Dep.	Dep.		Clear 11	Partly cloudy 10	Cloudy 10											

HOURLY PRECIPITATION (Water equivalent in inches)

Date	A. M. Hour ending at												P. M. Hour ending at												Date
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	
1							T	T	.01	.04	.05	.09	.05	.01	.02	.03	.04	.04	.02	.01	.01	T	.01	.01	1
2	T	T																							2
3																									3
4																									4
5	.02	.02	.01	T	T	T	.01	T	T	.01	T						.04	.02	.08	.07	.03	.05	T		5
6																									6
7																									7
8																									8
9																									9
10																									10
11						T	T	T	T	T		T	T	T	T	T	.01	.01	T	T					11
12	.01	T																					T	T	12
13																									13
14		T	T	T	T	.01	.04	.03	.07	.05	.01	.03	.01	.02	.03	T	T	T	T	T					14
15																							T	T	15
16	T																								16
17																									17
18																									18
19																									19
20						T	T																		20
21																				.01	T	T	T		21
22																									22
23							.01	.01	.04	.03	.03	.03	.01	T									T	T	23
24																									24
25	T	.01	.02	T																					25
26																									26
27		T	T					.04	T																27
28																									28
29																									29
30	T	.03	.05	.01	.01	T	T																		30
31	T	T																					T	T	31

* Extreme temperatures for the month. May be the last of more than one occurrence.
- Below zero temperature or negative departure from normal.
* 70° at Alaskan stations.
Also on an earlier date, or dates.
X Heavy fog restricts visibility to 1/4 mile or less.
T In the Hourly Precipitation table and in columns 9, 10, and 11 indicates an amount too small to measure.
The season for degree days begins with July for heating and with January for cooling.
Data in columns 6, 12, 13, 14, and 15 are based on 8 observations per day at 3-hour intervals.
Wind directions are those from which the wind blows. Resultant wind is the vector sum of wind directions and speeds divided by the number of observations.
Figures for directions are tens of degrees from true North, i.e., 09 = East, 18 = South, 27 = West, 36 = North, and 00 = Calm. When directions are in tens of degrees in Col. 17, entries in Col. 16 are fastest observed 1-minute speeds. If the / appears in Col. 17, speeds are gusts.
Any errors detected will be corrected and changes in summary data will be annotated in the annual summary.

Subscription Price: Local Climatological Data \$1.00 per year including annual summary if published. Single copy: 10 cents for monthly summary; 15 cents for annual summary. Checks or money orders should be made payable and remittances and correspondence should be sent to the Superintendent of Documents, U.S. Government Printing Office, Washington, D. C. 20402.

I certify that this is an official publication of the National Oceanic and Atmospheric Administration, and is compiled from records on file at the National Climatic Center, Asheville, North Carolina 28801.

William H. Haggard
Director, National Climatic Center

SUMMARY BY HOURS

AVERAGES										Resultant wind	
Hour	Local time	Sky cover	Station pressure in.	Temperature			Relative humidity %	Wind speed m.p.h.	Direction	Speed m.p.h.	
				Air °F	Wet bulb °F	Dew pt. °F					
01	5	29.88	21	19	21	66	6.6	28	10.8		
04	4	29.87	21	19	21	67	6.6	27	10.4		
07	6	29.86	21	19	21	66	6.6	27	9.9		
10	6	29.90	23	21	23	63	6.6	29	12.0		
13	6	29.83	27	23	23	60	6.6	29	10.8		
16	5	29.84	27	24	23	57	6.6	29	12.3		
19	5	29.87	25	22	21	56	6.6	28	12.5		
22	5	29.88	23	20	21	63	6.6	26	11.5		

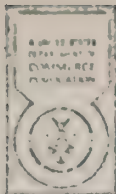
OBSERVATIONS AT 3-HOUR INTERVALS									
NO. 1		NO. 2		NO. 3		NO. 4		NO. 5	
TIME	TEMP.	TIME	TEMP.	TIME	TEMP.	TIME	TEMP.	TIME	TEMP.
0000	50.0	0300	48.0	0600	46.0	0900	44.0	1200	42.0
0300	46.0	0600	44.0	0900	42.0	1200	40.0	1500	38.0
0600	44.0	0900	42.0	1200	40.0	1500	38.0	1800	36.0
0900	42.0	1200	40.0	1500	38.0	1800	36.0	2100	34.0
1200	40.0	1500	38.0	1800	36.0	2100	34.0	2400	32.0
1500	38.0	1800	36.0	2100	34.0	2400	32.0		
1800	36.0	2100	34.0	2400	32.0				
2100	34.0								
2400	32.0								

Directions are those from which the wind blows, indicated in tens of degrees from true North; i.e., 09 for East, 18 for South, 27 for West. Entry of (R) in the direction column indicates calm.

Speed is expressed in knots; multiply by 1.5 to convert to miles per hour.

ADDITIONAL DATA
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YEAR & MONTH: 71 01



LOCAL CLIMATOLOGICAL DATA

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
ENVIRONMENTAL DATA SERVICE

BOSTON, MASSACHUSETTS
LOGAN INTERNATIONAL AIRPORT
FEBRUARY 1971

Latitude 42° 22' N Longitude 71° 02' W Elevation (ground) 15 ft Standard time used EASTERN #94N 014739

Date	Temperature °F						Degree days Base 65°		Weather types on dates of occurrence 1 Fog 2 Heavy fog 3 Thunderstorm 4 Ice pellets 5 Hail 6 Glaze 7 Duststorm 8 Smoke, haze 9 Blowing snow	Snow- ice pellets or ice on ground at 07AM In.	Precipitation		Avg station pressure In. Elev. 29 feet msl	Wind			Sunshine		Sky cover Tenths		Date		
	Maximum	Minimum	Average	Departure from normal	Average dew point		Heating	Cooling			Water equiva- lent In.	Snow- ice pellets In.		Resultant direction Resultant speed m.p.h.	Average speed m.p.h.	Fastest mile	Hours and tenths	Percent of possible	Sunrise to sunset	Midnight to midnight			
1	19	8	14	-16	-7		51	0			0		0	29.87	30	14.1	15.2	22	9.8	88	1	1	1
2	18	8	13	-17	-9		52	0			0		0	30.30	23	22.0	22.3	29	10.0	100	3	2	2
3	20	5	13	-17	-4		52	0			0		0	30.64	31	8.3	9.9	14	10.1	100	2	1	3
4	23	0	16	-14	5		49	0			0		0	30.58	05	2.3	6.8	11	9.8	97	5	0	4
5	36	22	29	-1	28		36	0	2 4 6		.87	2	2.7	30.03	12	13.7	10.8	25	0.0	0	10	10	5
6	42	29	36	6	28		29	0	1	8	0	2	0	29.87	28	8.1	8.9	17	8.9	87	2	4	6
7	38	28	33	3	27		32	0		8	0	1	0	30.22	07	6.3	10.2	22	7.7	76	7	8	7
8	35	31	33	3	32		32	0	1 4 6		1.30	2	1	29.73	04	23.4	24.6	42	0.0	0	10	10	8
9	40	23	33	3	38		32	0	1 4		.03	2	7	29.45	25	16.0	19.1	31	2.7	26	9	7	9
10	28	18	23	-7	10		42	0			0		0	29.95	27	18.0	18.8	26	10.4	100	1	1	10
11	34	19	27	-3	14		38	0			0		0	30.28	22	11.5	12.8	17	9.5	91	9	8	11
12	46	32	39	9	31		26	0			0		0	30.11	21	14.1	14.2	19	9.8	93	9	9	12
13	53	32	43	13	39		22	0	2		1.12		0	29.64	14	5.8	11.7	29	0.0	0	10	9	13
14	43	22	33	3	22		32	0			0		0	29.29	25	20.5	24.9	40	3.4	32	9	8	14
15	34	22	28	-2	12		37	0			0		0	29.78	28	18.2	18.6	23	8.1	76	7	4	15
16	37	23	30	0	12		35	0			0		0	30.08	31	14.7	15.4	19	10.5	98	0	0	16
17	38	20	29	-1	17		36	0		8	0		.12	30.24	18	2.3	9.8	19	8.5	80	5	5	17
18	48	32	40	10	31		25	0		8	1		0	30.01	26	11.7	12.2	17	6.0	56	6	5	18
19	45	32	39	9	27		26	0			0		0	30.15	32	7.1	9.9	17	10.0	95	7	8	19
20	35	27	31	1	32		34	0	1 4 6		.38		0	29.99	07	9.6	13.7	20	0.0	0	10	10	20
21	31	26	29	-2	25		36	0	1 4 6		.07		0	29.97	36	7.5	8.9	15	0.0	0	10	10	21
22	35	29	32	1	30		33	0	1 4 6 8		.1		0	30.10	08	4.9	5.9	14	0.0	0	10	10	22
23	35	26	31	0	32		34	0	1 4		.65		0	29.54	06	18.0	24.2	30	0.0	0	10	10	23
24	34	24	29	-2	22		36	0			.03		0	29.70	36	7.5	10.2	21	4.8	43	9	8	24
25	39	27	33	2	28		32	0	1		.06		0	29.87	27	6.1	9.5	17	3.4	31	10	7	25
26	45	29	37	5	29		28	0		8	0		0	30.09	23	3.4	7.3	14	11.1	100	5	4	26
27	46	33	40	8	39		25	0	2		.42		0	29.83	16	6.4	9.8	20	0.0	0	10	10	27
28	51	38	45	13	28		20	0	1		0		0	29.70	25	16.8	17.1	31	10.2	91	3	2	28
Sum 1029																						Total	
Sum		675						962		0				Total		5.05		8.1		29.96		26	
Avg		675						962		0				Total		5.05		8.1		29.96		26	
Avg		675						962		0				Total		5.05		8.1		29.96		26	
Avg		675						962		0				Total		5.05		8.1		29.96		26	
Avg		675						962		0				Total		5.05		8.1		29.96		26	
Avg		675						962		0				Total		5.05		8.1		29.96		26	
Avg		675						962		0				Total		5.05		8.1		29.96		26	
Avg		675						962		0				Total		5.05		8.1		29.96		26	
Avg		675						962		0				Total		5.05		8.1		29.96		26	
Avg		675						962		0				Total		5.05		8.1		29.96		26	
Avg		675						962		0				Total		5.05		8.1		29.96		26	
Avg		675						962		0				Total		5.05		8.1		29.96		26	
Avg		675						962		0				Total		5.05		8.1		29.96		26	
Avg		675						962		0				Total		5.05		8.1		29.96		26	
Avg		675						962		0				Total		5.05		8.1		29.96		26	
Avg		675						962		0				Total		5.05		8.1		29.96		26	
Avg		675						962		0				Total		5.05		8.1		29.96		26	
Avg		675						962		0				Total		5.05		8.1		29.96		26	
Avg		675						962		0				Total		5.05		8.1		29.96		26	
Avg		675						962		0				Total		5.05		8.1		29.96		26	
Avg		675						962		0				Total		5.05		8.1		29.96		26	
Avg		675						962		0				Total		5.05		8.1		29.96		26	
Avg		675																					

[illegible]

NOTES

CEILING & COLUMNS—
UN1 indicates an unlimited ceiling.

WEATHER COLUMN—

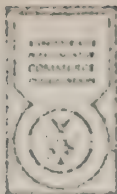
T	Tornado
+	Thunderstorm
Q	Squall
R	Rain
RW	Rain showers
/R	Freezing rain
Z	Drizzle
/Z	Freezing drizzle
S	Snow
NP	Snow pellets
IC	Ice crystals
SW	Snow showers
SG	Snow grains
IP	Ice pellets
A	Hail
F	Fog
H	Ice fog
G	Ground fog
BD	Blowing dust
BS	Blowing sand
BN	Blowing snow
HY	Blowing spray
K	Smoke
H	Haze
D	Dust

WIND COLUMNS—
Directions are those from which the wind blows, indicated in tens of degrees from true North; i. e., 09 for East, 18 for South, 27 for West. Entry of 00 in the direction column indicates calm.

Speed is expressed in knots; multiply by 1.15 to convert to miles per hour.

ADDITIONAL DATA
Other observational data contained in records on file can be furnished at cost via microfilm, microfiche, or paper copies of the original records. Inquiries as to availability and costs should be addressed to: Director, National Climatic Center, Federal Building, Asheville, North Carolina 28801.

STATION: BOSTON MASS YEAR & MONTH: 71 02



LOCAL CLIMATOLOGICAL DATA

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
ENVIRONMENTAL DATA SERVICE

BOSTON, MASSACHUSETTS
LOGAN INTERNATIONAL AIRPORT
MARCH 1971

Latitude 42° 22' N Longitude 71° 02' W Elevation (ground) 15 ft Standard time used: EASTERN GRAN #14739

Date	Temperature °F					Degree days Base 65		Weather types on dates of occurrence 1 Fog 2 Heavy fog 3 Thunderstorm 4 Ice pellets 5 Hail 6 Glaze 7 Duststorm 8 Smoke, Haze 9 Blowing snow	Snow, ice pellets or ice on ground at 07AM In.	Precipitation		Avg. station pressure In. Elev. 29 feet m.s.l.	Wind			Fastest mile	Sunshine		Sky cover Tenths		Date	
	Maximum	Minimum	Average	Departure from normal	Average dew point	Heating	Cooling			Water equivalent In.	Snow, ice pellets In.		Resultant direction	Resultant speed m.p.h.	Average speed m.p.h.		Speed m.p.h.	Direction	Hours and tenths	Percent of possible		Sunrise to sunset
1	47	35	41	0	22	24	0		0	0	0	29.97	27	17.0	17.5	24	NW	11.0	99	4	2	1
2	43	30	37	3	21	20	0		0	0	0	30.04	27	4.3	10.5	14	NW	10.6	94	6	3	2
3	35	30	33	-1	29	32	0	1 4 6	0	.44	1.7	29.94	07	20.4	21.4	33	E	0.0	0	10	10	3
4	41	26	34	0	28	31	0	1 4 6 8	1	.96	.5	28.92	24	5.7	33.2	55	SW	3.4	29	10	4	4
5	37	26	32	-3	16	33	0		1	0	0	29.50	28	34.2	34.4	50	NW	10.7	94	7	4	5
6	44	30	37	2	19	28	0		0	0	0	29.87	26	9.4	10.6	20	W	10.4	91	8	5	-6
7	38	32	35	0	33	30	0	2 4 8	0	.25	0	29.50	07	5.4	14.1	23	W	0.0	0	10	10	7
8	36	26	31	-1	20	34	0		0	0	0	29.36	26	21.3	21.7	30	W	9.1	79	7	5	8
9	35	24	30	-1	13	35	0		0	0	0	29.70	27	23.3	23.9	28	W	10.9	94	1	2	9
10	42	25	34	-2	15	31	0		0	0	0	30.06	26	10.6	13.1	17	NW	11.3	97	3	3	10
11	34	30	32	-4	30	33	0	1 4	0	.54	4.0	29.89	01	9.0	13.2	17	N	0.0	0	10	9	11
12	42	29	36	-1	23	29	0		3	0	0	29.94	29	14.8	15.5	19	NW	11.4	97	3	4	12
13	39	29	34	-3	31	31	0		1	.01	0	30.01	07	5.8	8.1	11	E	6.8	57	10	9	13
14	41	31	36	-1	34	29	0	2 8	1	.17	1.2	30.04	18	3.5	6.2	17	SW	0.6	5	10	9	14
15	60	33	47	10	44	18	0	1 8	0	.02	0	29.71	22	18.2	18.6	32	SW	0.5	4	10	10	15
16	65	40	53	15	36	12	0		0	0	0	29.66	26	10.9	13.2	30	SW	10.0	84	4	4	16
17	44	33	39	1	23	26	0		0	0	0	29.81	32	10.6	11.5	19	N	3.0	25	9	7	17
18	43	28	35	-3	13	29	0		0	0	0	30.04	32	15.7	16.0	26	NW	11.6	97	0	2	18
19	41	29	35	-4	20	30	0	1 4	0	.67	0	29.93	14	3.4	12.2	26	E	6.3	52	8	8	19
20	45	31	38	-1	32	27	0	1	0	.02	0	29.22	26	12.6	14.7	23	NW	6.4	53	8	8	20
21	42	33	38	-1	25	27	0		0	0	0	29.44	28	17.1	17.5	29	W	7.8	64	10	7	21
22	47	32	40	1	19	25	0		0	0	0	29.73	28	15.4	15.8	21	NW	11.7	96	2	4	22
23	41	32	37	-3	17	28	0		0	0	0	29.66	34	5.0	10.5	19	NW	9.9	81	7	7	23
24	37	26	32	-8	12	33	0		0	0	0	29.72	29	15.8	16.1	28	NW	12.0	98	3	-2	24
25	42	23	33	-7	12	32	0		0	0	0	30.03	30	16.6	16.7	24	NW	12.1	98	0	0	25
26	41	26	34	-6	15	32	0		0	0	0	30.20	28	1.3	10.2	17	NW	11.5	92	7	5	26
27	40	29	35	-6	22	30	0		0	0	0	30.12	03	14.9	15.5	26	NE	10.6	85	9	7	27
28	46	30	38	-3	20	27	0		0	0	0	29.82	03	6.4	12.7	20	N	12.1	97	4	4	28
29	57	34	46	5	28	19	0		0	0	0	29.56	27	8.7	10.4	20	NW	6.9	55	10	8	29
30	50	35	43	1	23	22	0		0	0	0	29.72	28	14.1	14.4	22	NW	12.3	97	5	4	30
31	50	32	41	-1	19	26	0		0	0	0	29.93	33	12.7	13.7	27	NW	11.7	92	5	5	31
Sum		Sum			Total		Total	Number of days		Total	Total	For the month		Total		Total		Sum		Sum		
1345		929			868		0	Precipitation		3.08	7.4	29.77		29		8.2		55		252.6		179
Avg		Avg			Avg		Dep	Precipitation		Dep	Dep	Date: 04		Possible month		Avg		Avg		Avg		
43.4		30.0			36.7		-1.0	Season to date		9	-1.14	370.3		68		6.2		5.8		5.8		
Number of days		Total		Total		Total		Snow, ice pellets		Greatest in 24 hours and dates		Greatest depth on ground of snow, ice pellets or ice and date										
Maximum Temp.		Minimum Temp.		Season to date		Total		= 1.0 inch		Precipitation		Snow, ice pellets										
> 50° F		< 32°		< 32°		< 0°		Thunderstorms		Heavy fog X		2		1.40		3-4		4.0		11		
0		0		24		0		315		Clear 6		Partly cloudy 11		Cloudy 14								


Note: "Fastest mile" speed entry on 7th is fastest observed one-minute speed.

HOURLY PRECIPITATION (Water equivalent in inches)

Date	A. M. Hour ending at												P. M. Hour ending at												Date
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	
1																									1
2																									2
3																									3
4	.06	.14	.08	.08	.15	.22	.06	.05	.11	.01	T	T	T	T	T	T	.02	.03	.04	.06	.07	.07	.06	.09	4
5																									5
6																									6
7																									7
8																									8
9																									9
10																									10
11																									11
12																									12
13																									13
14	.09	.08	T	T																				.01	14
15																									15
16																									16
17																									17
18	T																								18
19																									19
20	.01	T	T																						20
21																									21
22																									22
23																									23
24																									24
25																									25
26																									26
27																									27
28																									28
29																									29
30																									30
31																									31

* Extreme temperatures for the month. May be the last of more than one occurrence.
- Below zero temperature or negative departure from normal.
+ 70° at Alaskan stations.
X Also on an earlier date, or dates.
Hes fog restricts visibility to 1/4 mile or less.
T In Hourly Precipitation table and in columns 9, 10, and 11 indicates an amount too small to measure.

The season for degree days begins with July for heating and with January for cooling.
Data in columns 6, 12, 13, 14, and 15 are based on 8 observations per day at 3-hour intervals.
Wind directions are those from which the wind blows. Resultant wind is the vector sum of wind directions and speeds divided by the number of observations.
Figures for directions are tens of degrees from true North; i.e., 09 = East, 18 = South, 27 = West, 36 = North, and 00 = Calm. When directions are in tens of degrees in Col. 17, entries in Col. 16

10. **What is the purpose of the "About" section in a business plan?**

[illegible]

TABLE II.2.11

TEST RESULTS FOR REINFORCING STEEL

TAKEN FROM COLLAPSED PIECES

BUILDING COLLAPSE
2000 COMMONWEALTH AVENUE
BRIGHTON, MASSACHUSETTS

REINFORCING STEEL DEFORMATIONS

Test Numbers	- RR 218, 249, 274 (Supplement)
Test Procedure	- ASTM A615-68 and A616-68
Results	- The following data have been obtained:

T&L Test Number	Type	Size	Grade	Deformation, in.		Deformation Spec., in.	
				Spacing	Height	Max. Spacing	Min. Height
RR 218 -	4A Billet	#4	60	0.265	0.034	0.125	0.125
	4B "	#4	60	0.273	0.034	0.125	0.125
	4C "	#4	60	0.200	0.034	0.063	0.063
	6C "	#6	60	0.514	0.036	0.141	0.141
	11A "	#11	60	0.670	0.091	0.125	0.125
	11B "	#11	60	0.670	0.073	0.172	0.172
RR 249	6A Rail	#6	60	0.513	0.045	0.125	0.125
	6B "	#6	60	0.523	0.045	0.125	0.125
	6A Billet	#6	60	0.515	0.047	0.156	0.156
	6B Rail	#6	60	0.524	0.043	0.109	0.109
	8 Rail	#8	60	0.688	0.058	0.156	0.156
	A Billet	#3	40	0.188	0.018	0.047	0.047
RR 274	B "	#4	60	0.184	0.026	0.078	0.078
	D "	#4	60	0.243	0.042	0.125	0.125
	F "	#6	60	0.406	0.050	0.141	0.141
	H "	#6	60	0.219	0.042	0.188	0.188
	J "	#8	60	0.422	0.062	0.109	0.109
	K "	#8	60	0.444	0.054	0.094	0.094

T&L Test Number	Type	Size	Grade	Deformation, in.			Deformation Spec., Inches			
				Spacing	Height	Gap	Max. Spacing	Min. Height	Max. Gap	
RR 274	M	Billet	#11	60	0.665	0.089	0.125	0.987	0.071	0.540
	C	Rail	#4	60	0.349	0.034	0.109	0.350	0.020	0.191
	E	"	#5	60	0.428	0.042	0.125	0.437	0.028	0.239
	G	"	#6	60	0.524	0.042	0.125	0.525	0.038	0.286
	I	"	#8	60	0.715*	0.057	0.125	0.700	0.050	0.383
	L	"	#9	60	0.785	0.057	0.156	0.790	0.056	0.431

* Requirements not met.

THE THOMPSON & LIGHTNER CO., INC.

A. Shrestinian
A. Shrestinian

ENGINEERS

BOSTON, MASS.

ASTM Designation: A615-68

THE MATERIALS LISTED BELOW HAVE BEEN TESTED AND INSPECTED IN ACCORDANCE WITH SPECIFICATION
MANUFACTURED BY _____ FOR _____
CONSIGNEE TO _____

NO. OF PIECES	DESCRIPTION OF MATERIALS	Lab WEIGHT	Area TESTING SQ. IN.	YIELD POINT PER SQ. IN.	TENSILE STRENGTH PER SQ. IN.	ELONGA- TION PER CENT IN 8 IN. PER CENT	FRACTURE	BEND TESTS		GRADE	CHEMICAL ANALYSIS			
								HOT	COLD		CAR	MM	PHOS.	SUL.
2	#4 Deformed bars Marked Eln60	4A 4B	0.1915 0.1964	73,110 72,540	117,490 109,450	12.1 16.4	Mod C/C Diag	-	-	60				
1	#4 Deformed bar Marked Oln60	4C	0.1854	64,710	97,070	18.0	Mod C/C	-	-	60				
1	#6 Deformed bar	6C	0.4431	59,800	95,910	17.2	C/C	-	-	60				
2	#11 Deformed bars Marked M-11-N with long continuous line	11A 11B	1.5444 1.600	68,340 69,390	104,290 101,900	15.6 18.8	Flat Mod C/C	-	-	60 60				
	ASTM Designation: A615-68 Grade 60 requirements			60,000 Min	90,000 Min	9.0 Min 7.0 Min	for #11 & #6 for #11							
	Requirements for ASTM: A615-68 Grade 60 met except as noted.													

T&L Test No. RR218, received 2-2-71
tested 2-4-71

Requirements met except as marked.
THE THOMPSON & LIGHTNER CO., INC.

CERTIFIED CORRECT
A. Shroestonian
A. Shroestonian

FROM: FULBRIGHT COLLAPRO
2000 Commonwealth Avenue
Brighton, Massachusetts

THE THOMPSON & LIGHTNER CO., INC.
ENGINEERS
BOSTON, MASS.

REPORT NO. 1
SHEET No. 2 of 2
DATE May 4, 1971

THE MATERIALS LISTED BELOW HAVE BEEN TESTED AND INSPECTED IN ACCORDANCE WITH SPECIFICATION ASTM Designation: A616-68
MANUFACTURED BY _____ FOR _____
CONSIGNEE TO _____

NO. OF PIECES	DESCRIPTION OF MATERIALS	Job WEIGHT LBS.	APPROX. SQ. INCH	YIELD POINT PER SQ. IN.	TENSILE STRENGTH PER SQ. IN.	ELONGA- TION PER CENT IN 8 IN.	REDUC- TION OF AREA PER CENT	FRACTURE	BEND TESTS		GRADE	CHEMICAL ANALYSIS		
									HOT	COLD		CAR	PHOS.	SUL.
2	#6 Deformed bars Marked N 6 R	6A	0.4412	78,200	139,400	5.9*	-	Flat	-	-	60			
		6B	0.4338	74,920	134,280	9.8	-	Flat	-	-	60			
	ASTM Designation: A616-68			60,000	90000	1,000,000								
				Min	Min	TS Min								
					6A - 7.2 Min									
					6B - 7.4 Min									
	Requirements for ASTM Designation A616-68 Grade 60 met except as noted.													
					* Low									

T&L Test No. IR 218, received 2-2-71
tested 2-4-71

Requirements met.
THE THOMPSON & LIGHTNER CO., INC.
CERTIFIED CORRECT
A. Sirostian
A. Sirostian

ASTM A615-68

THE MATERIALS LISTED BELOW HAVE BEEN TESTED AND INSPECTED IN ACCORDANCE WITH SPECIFICATION

MANUFACTURED BY _____ FOR _____

CONSIGNEE TO _____

NO. OF PIECES	DESCRIPTION OF MATERIALS	Lab Mark	Area Sq. In.	YIELD POINT PER SQ. IN.	TENSILE STRENGTH PER SQ. IN.	ELONGA- TION PER CENT IN 8 IN.	REDUC- TION OF AREA PER CENT	FRACTURE	BEND TESTS		GRADE	CHEMICAL ANALYSIS			
									MOY	COLD		CAR	MN	PHOS.	SUL.
1	#3 Deformed, marked G-3-N	A	0.100	49700	78820	21.1	-	Mod C/C	-	-	40				
1	" " AC-4-N-60	B	0.191	62200	109190	12.5	-	Flac	-	-	60				
1	" " B-4-N-60	D	0.191	68210	100210	17.2	-	Mod C/C	-	-	60				
1	" " B-6-N-60	E	0.437	67580	113970	15.6	-	Mod C/C	-	-	60				
1	" " H-6-N-60	H	0.438	71920	122720	3.5*	-	Flac	-	-	60				
1	" " M-8-N	J	0.770	61070	102000	13.7	-	Mod C/C	-	-	60				
1	" " B-8-60	K	0.783	63550	102840	15.6	-	Ang.	-	-	60				
1	" " M-11-N	M	1.537	66050	100370	16.4	-	Mod C/C	-	-	60				
	ASTM A615-68														
	Grade 40 requirements			40000 min.	70000 min.	11.0	min.								
	ASTM A615-68														
	Grade 60 requirements			60000 min	90000 min	9.0	min	for #4 and #6							
						8.0	min	for #8							
						7.0	min	for #11							

Tail Test RR 274, received 2-16-71
tested 2-18-71

* Requirements met except as marked.
THE THOMPSON & LIGHTNER CO., INC.

CERTIFIED CORRECT

A. Shrestinian

200 Commonwealth Avenue
Brighton, Massachusetts

ENGINEERS

BOSTON, MASS.

SHEET NO. 2 of 2
DATE May 14, 1971

ASTM A616-68

THE MATERIALS LISTED BELOW HAVE BEEN TESTED AND INSPECTED IN ACCORDANCE WITH SPECIFICATION
MANUFACTURED BY _____ FOR _____
CONSIGNED TO _____

NO. OF PIECES	DESCRIPTION OF MATERIALS	Lab Mark	Area Heating Sq. In.	YIELD POINT PER SQ. IN.	TENSILE STRENGTH PER SQ. IN.	ELONGA- TION PER CENT IN 8 IN.	REDUC- TION OF AREA PER CENT	FRACTURE	BEND TESTS		GRADE	CHEMICAL ANALYSIS			
									HOT	COLD		CAR	MN	PHOS	SUL
1	#1 Deformed, marked N-4-R	C	0.194	70290	113290	11.7	-	Mod C/C	-	-	60				
1	" " " N-5-R	E	0.312	67350	110650	14.1	-	Flat	-	-	60				
1	" " " N-6-R	G	0.430	60490	104120	16.4	-	Flat	-	-	60				
1	" " " N-8-R	I	0.762	76730	120020	*	-	Flat	-	-	60				
1	" " " N-9-R	L	0.949	75360	125420	10.2	-	Flat	-	-	60				
	ASTM A616-68			60000	90000	1000000									
	Grade 60 requirements			min	min	lb									
						and									
						5.0% min. for #4, #5, #6, #8									
						4.5% min. for #9									
						* Fracture outside gage marks.									

T&L Test RR 274, received 2-16-71
tested 2-18-19-71

Requirements met.
THE THOMPSON & LIGHTNER CO., INC.
CERTIFIED CORRECT
A. Shresthman
A. Shresthman

From: Building Collapse
2000 Commonwealth Avenue
Brighton, Massachusetts

THE THOMPSON & LIGHTNER CO., INC.
ENGINEERS
BOSTON, MASS.

FILE NO. 3
REPORT NO. 1
SHEET NO. 1
DATE May 1, 1971

ASTM A615-68 and ASTM 616-68

THE MATERIALS LISTED BELOW HAVE BEEN TESTED AND INSPECTED IN ACCORDANCE WITH SPECIFICATION
MANUFACTURED BY _____ FOR _____
CONSIGNEE TO _____

NO. OF PIECES	DESCRIPTION OF MATERIALS	Lab WEIGHT Mark	Area S ₀ In ²	YIELD POINT PER SQ. IN.	TENSILE STRENGTH PER SQ. IN.	ELONGA- TION PER CENT IN 8	REDUC- TION OF AREA IN PER CENT	FRACTURE	BEND TESTS		GRADE	CHEMICAL ANALYSIS			
									HOT	COLD		CAR	MN	PHOS.	SUL
1	#6 Deformed bar Marked Tech 6160 from π 78 ASTM A615-68 Grade 60 requirements	6A	0.432	61300	99000	15.6	-	Flat	-	-	60				
1	#6 Deformed bar Marked N6R from π 13	6B	0.443	83700	140500	8.6	-	Flat	-	-	60				
1	#8 Deformed bar Marked N8R from π 81 ASTM A616-68 Grade 60 requirements	8	0.790	80700	129500	8.3	-	Flat	-	-	60				
				60000	90000	1000000 TS									
				Min.	Min.	and 5% min.									

T&L Test RR 249, received 2-11-71
tested 2-16-71

Requirements met.

THE THOMPSON & LIGHTNER CO., INC.

CERTIFIED CORRECT

A. Shroetman
A. Shroetman

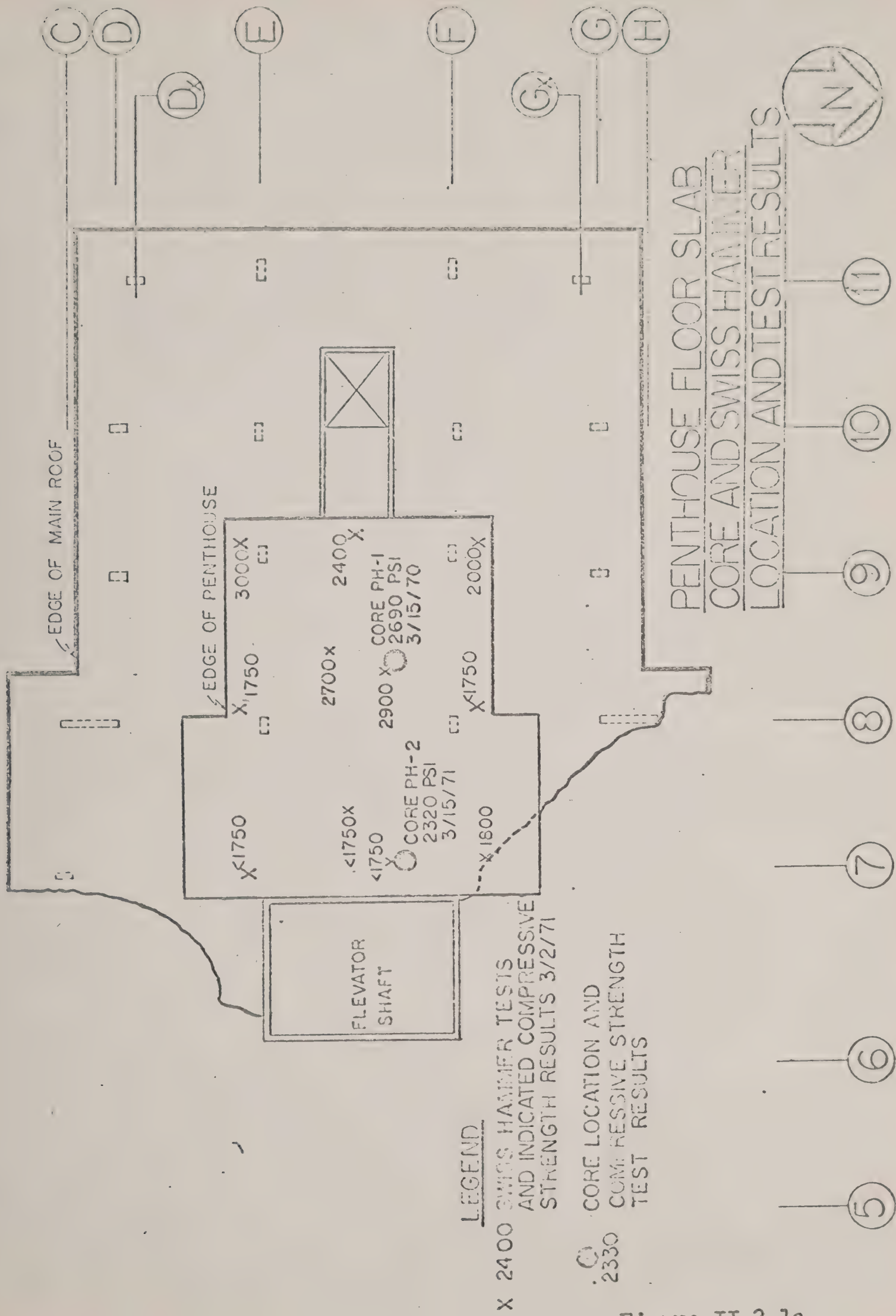


Figure II.2.1a

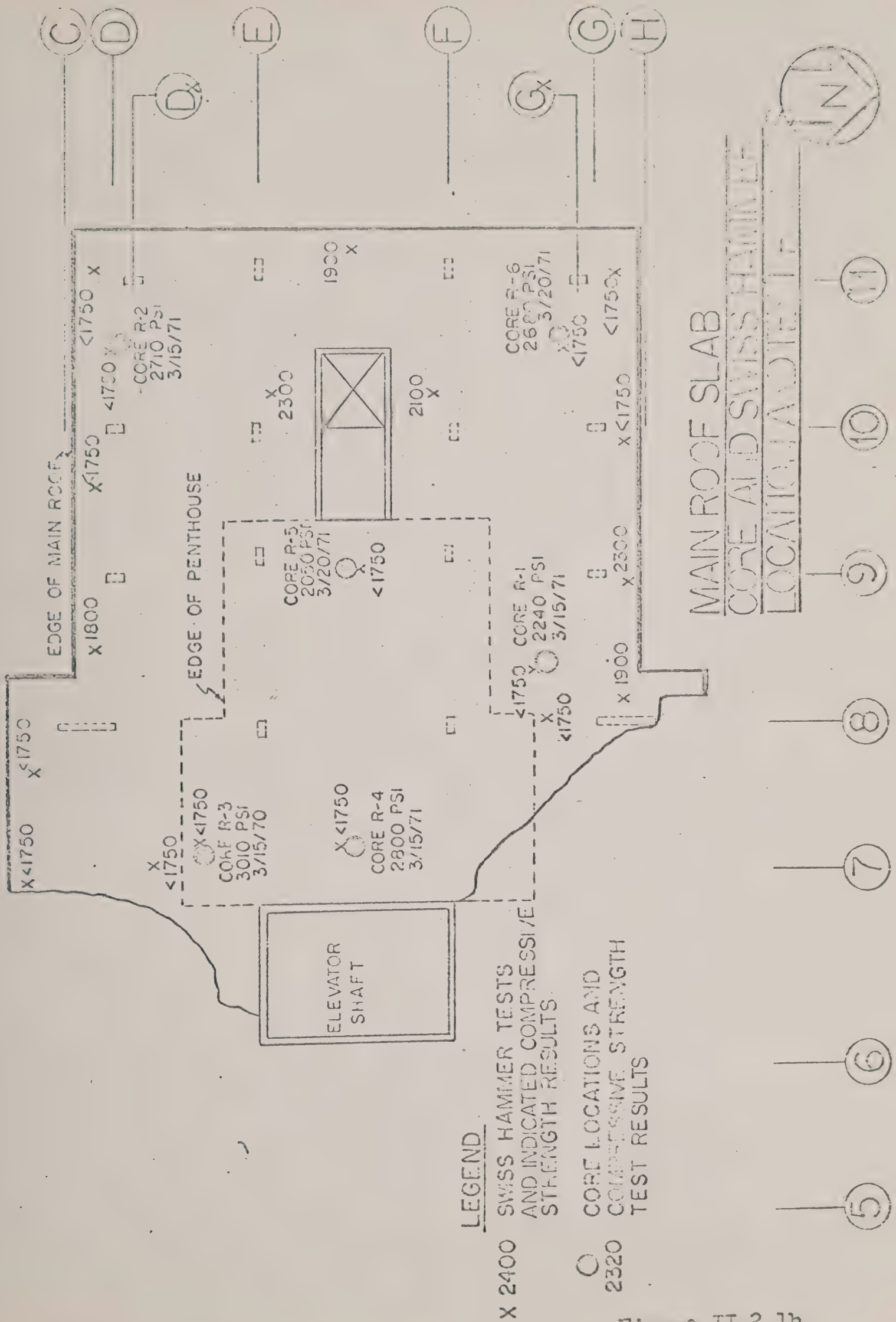


Figure II.2.1b

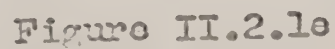


Figure II.2.1e

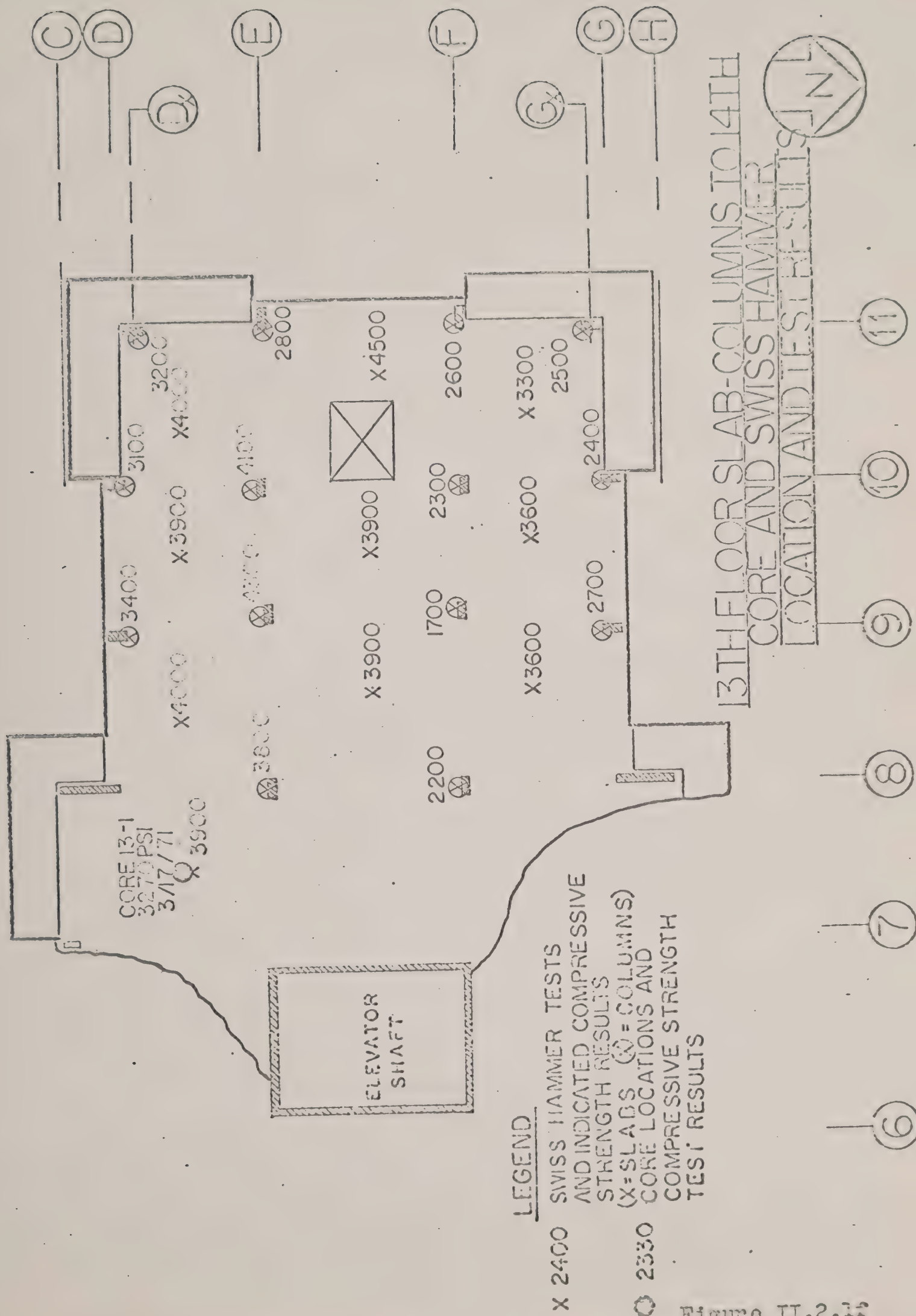


Figure II.2.12

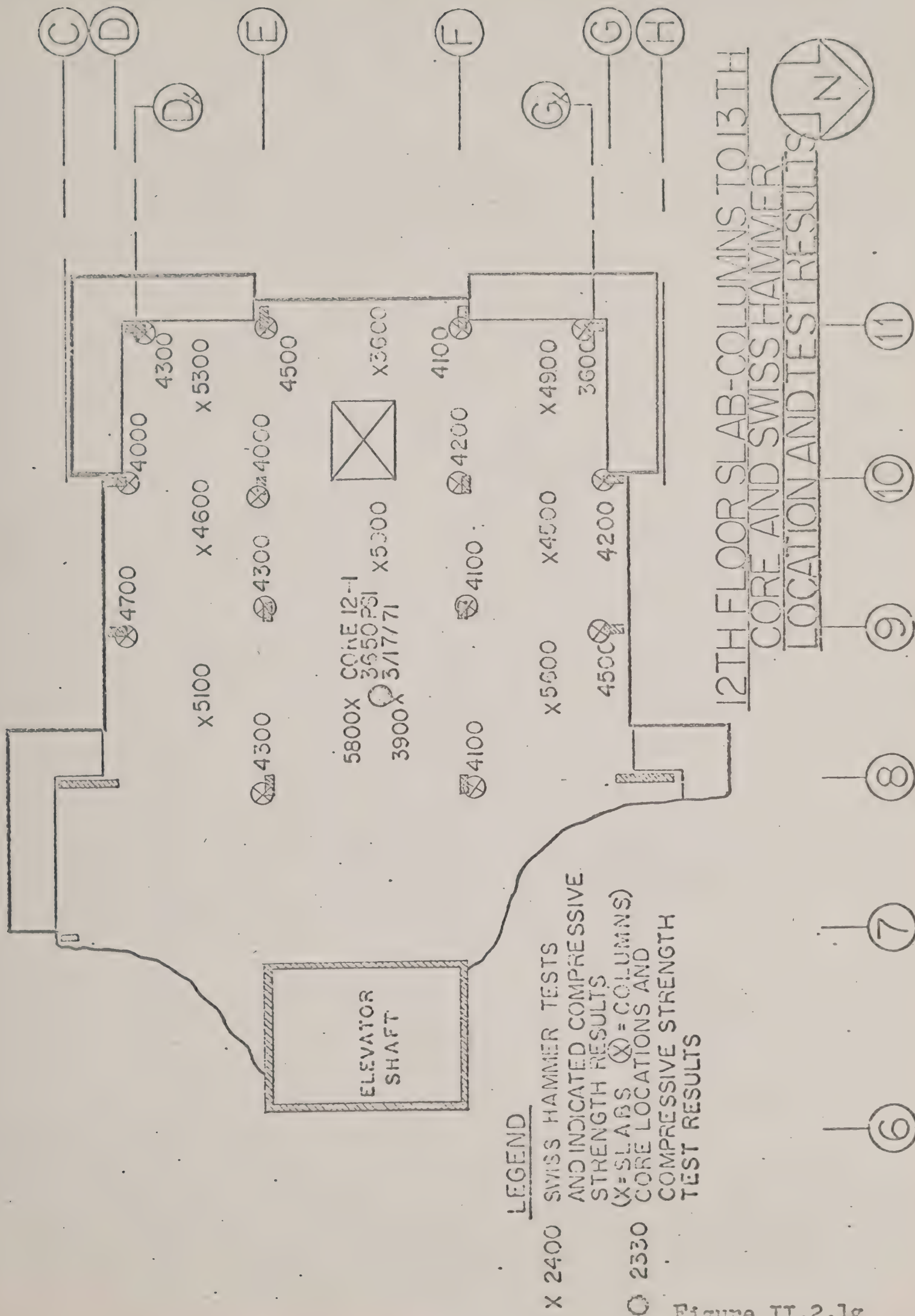


Figure II.2.1g

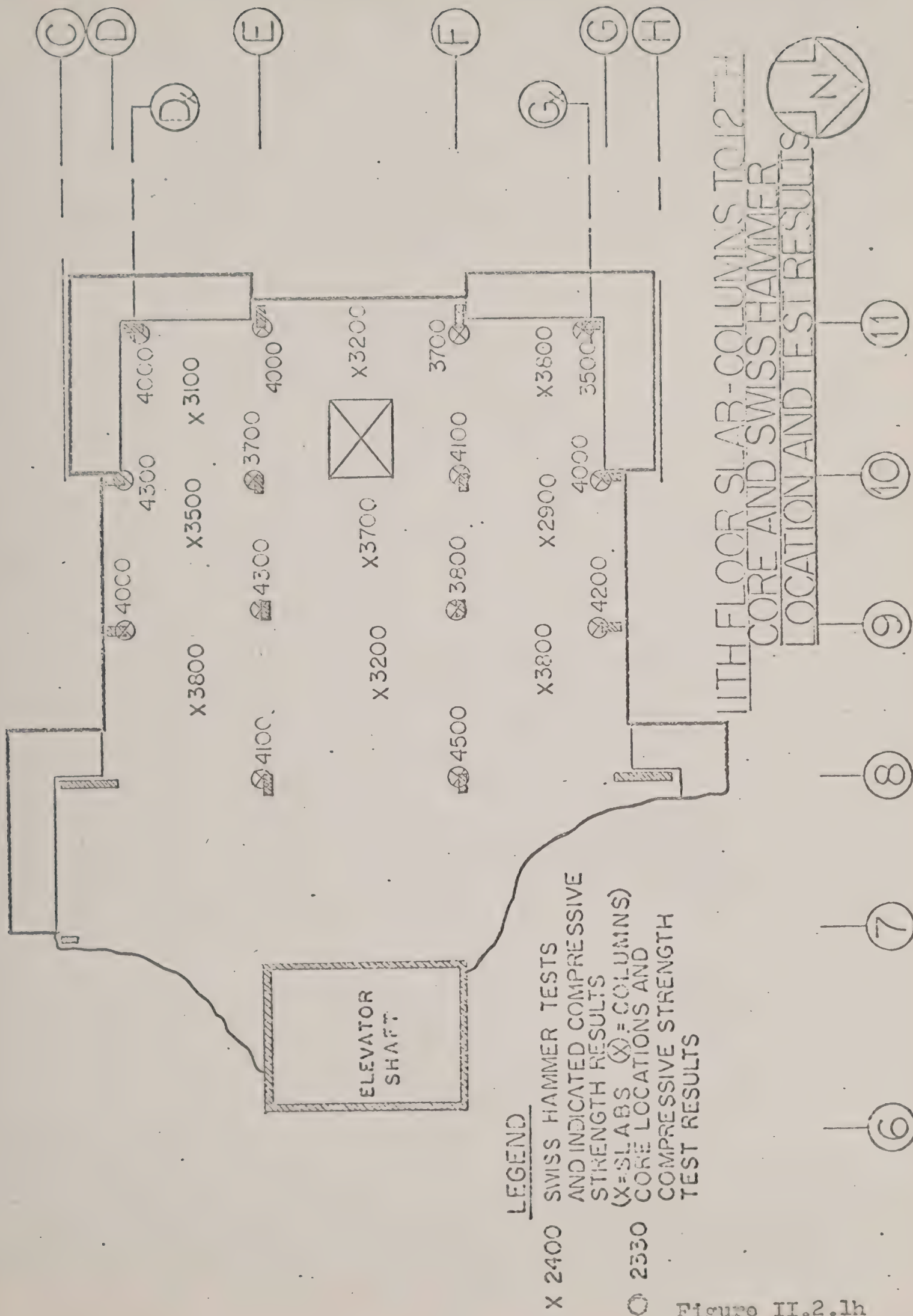


Figure II.2.1h

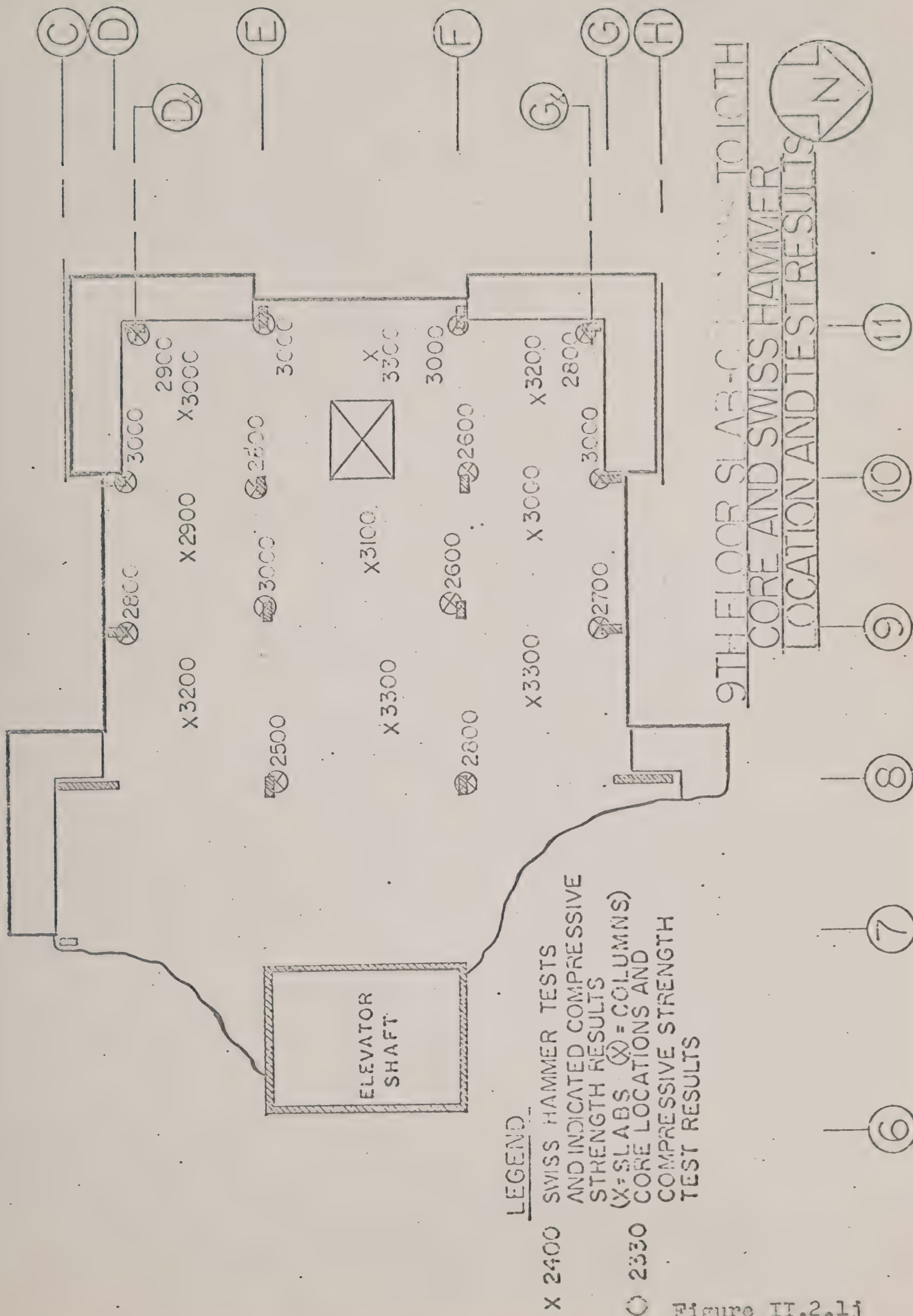
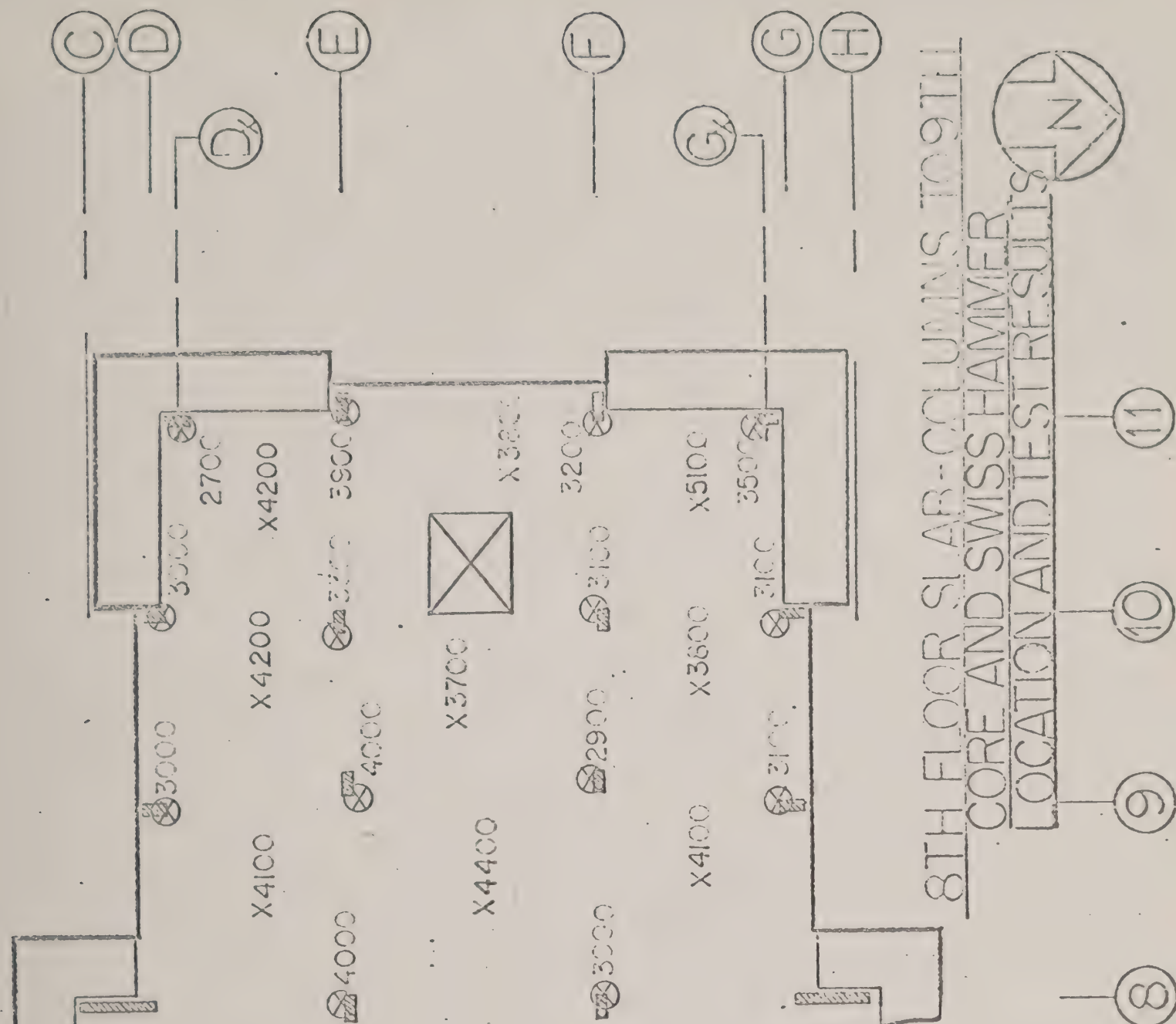


Figure II.2.1j



LEGEND

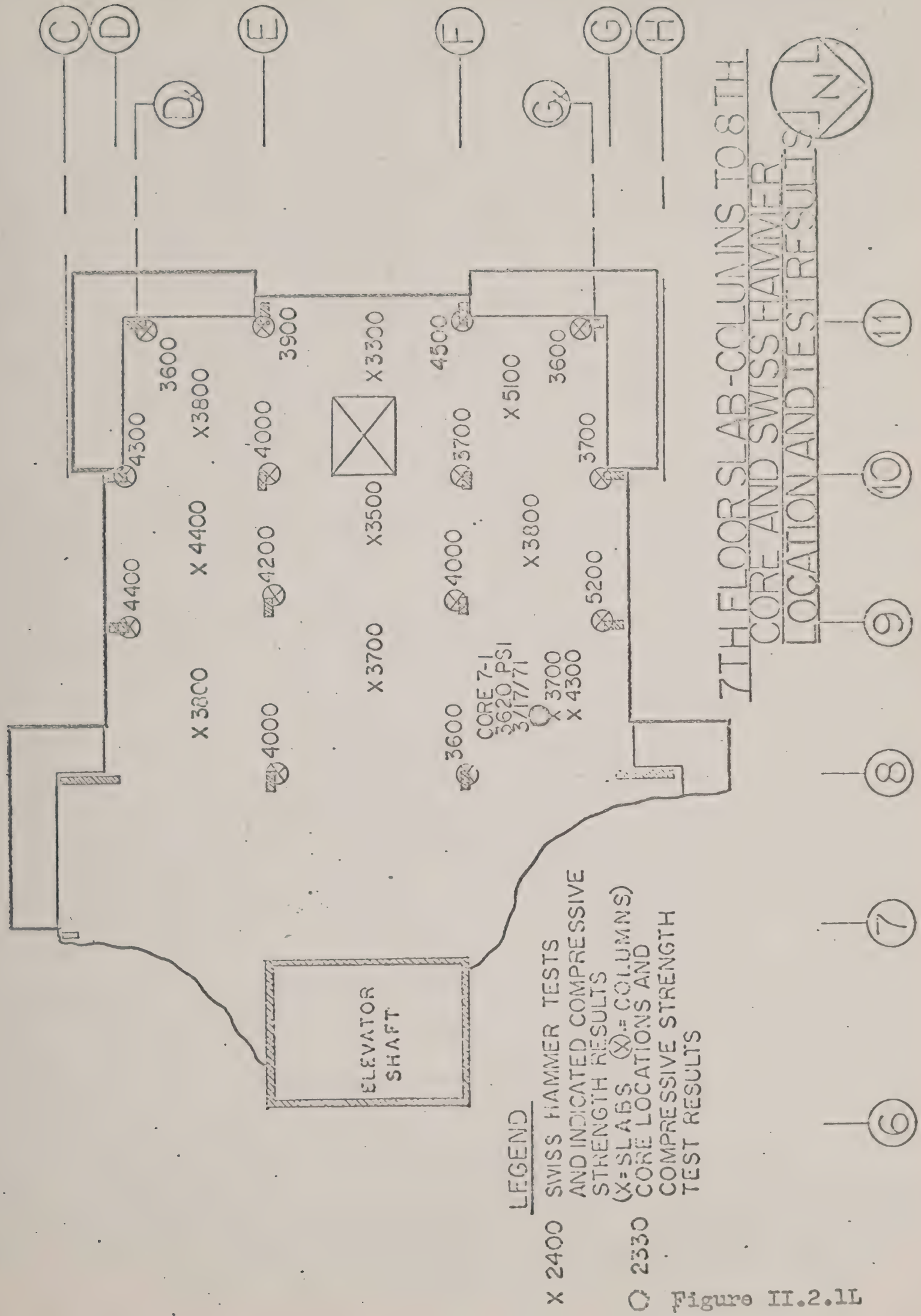
X 2400 SWISS HAMMER TESTS
AND INDICATED COMPRESSIVE
STRENGTH RESULTS
(X=SLABS (X)=COLUMNS)
CORE LOCATIONS AND
COMPRESSIVE STRENGTH
TEST RESULTS

X 2400

2330



Figure II.2.1k



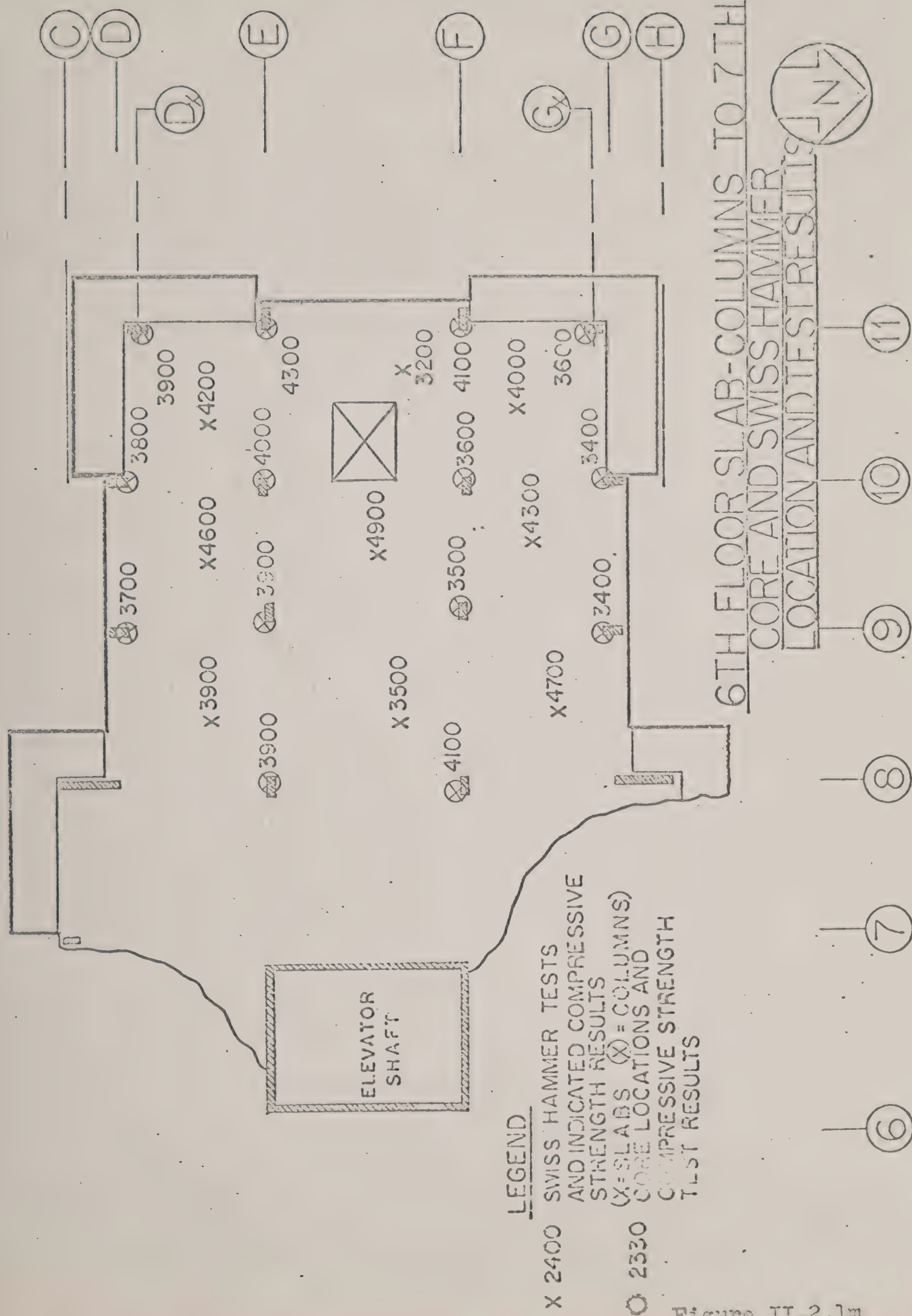


Figure II.2.1m

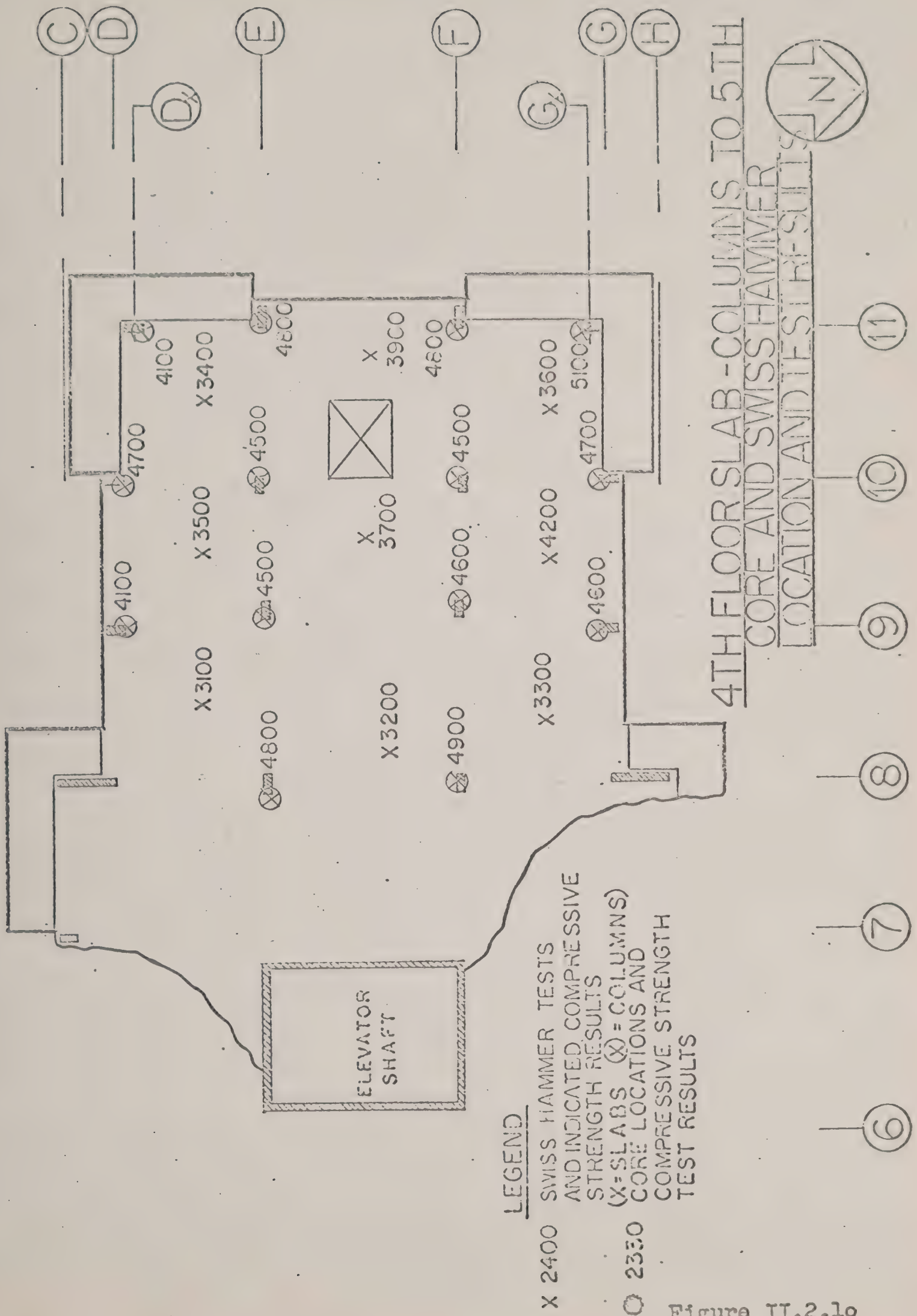


Figure II.2.10

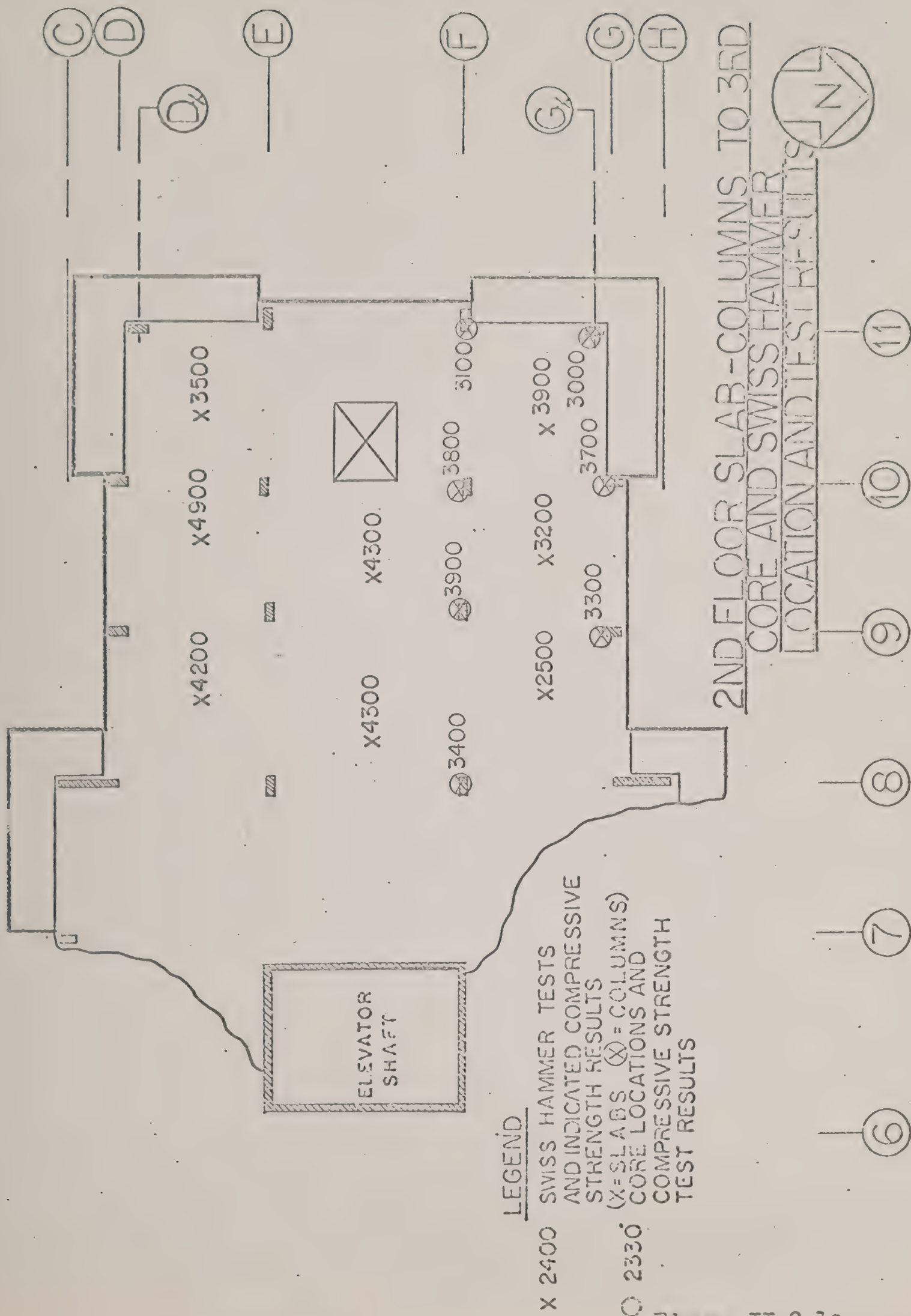


Figure II.2.1q

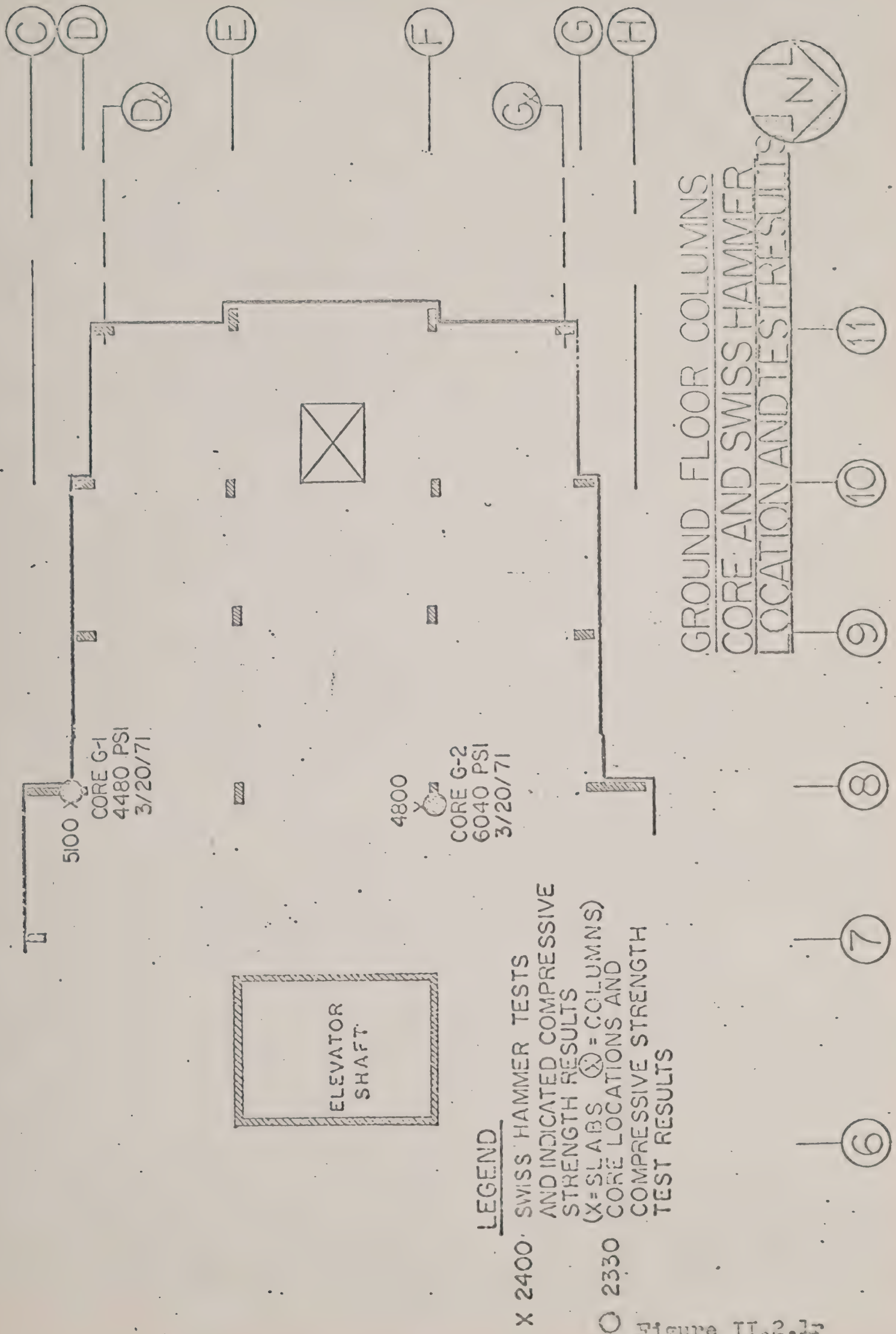


Figure II.2.1r

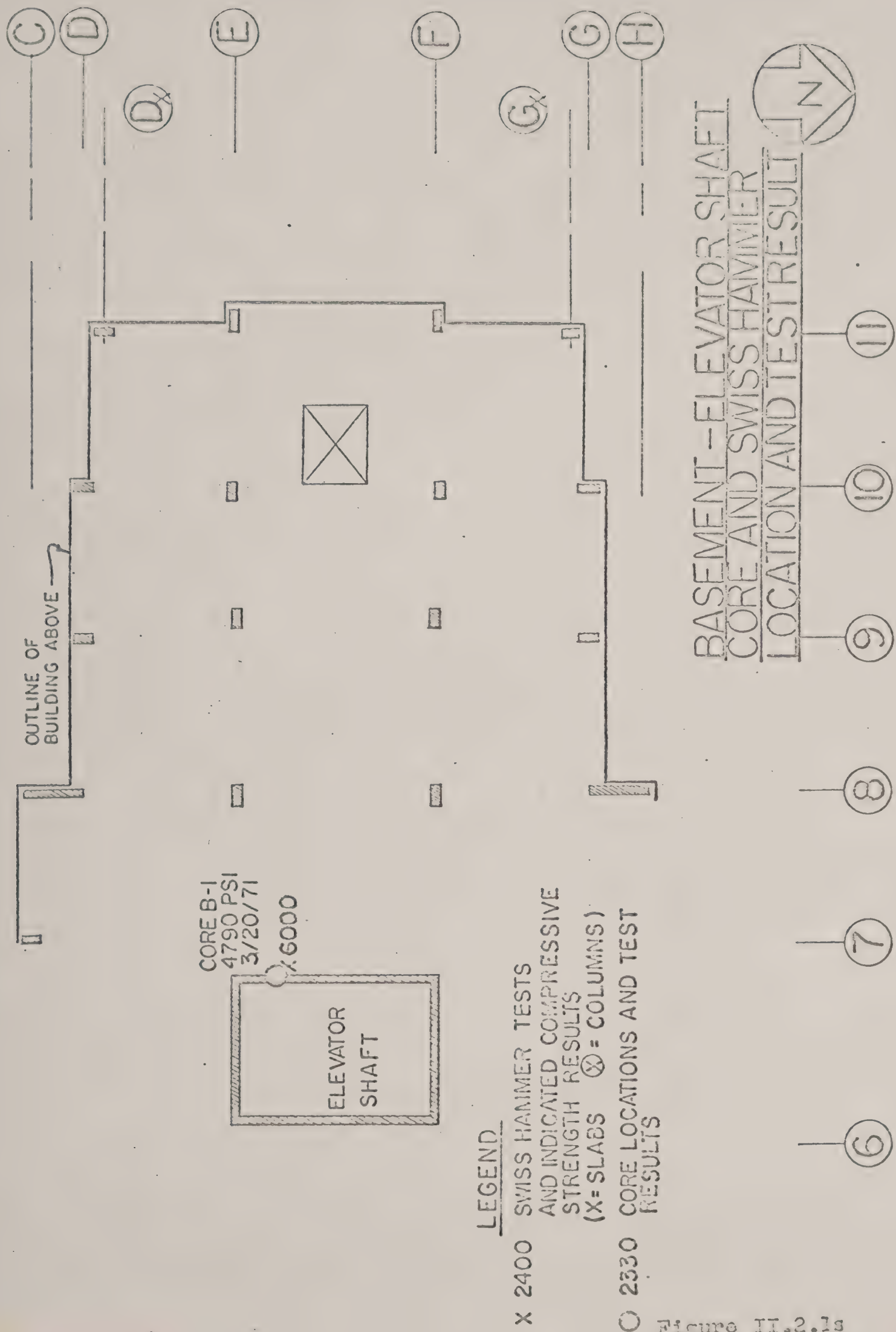
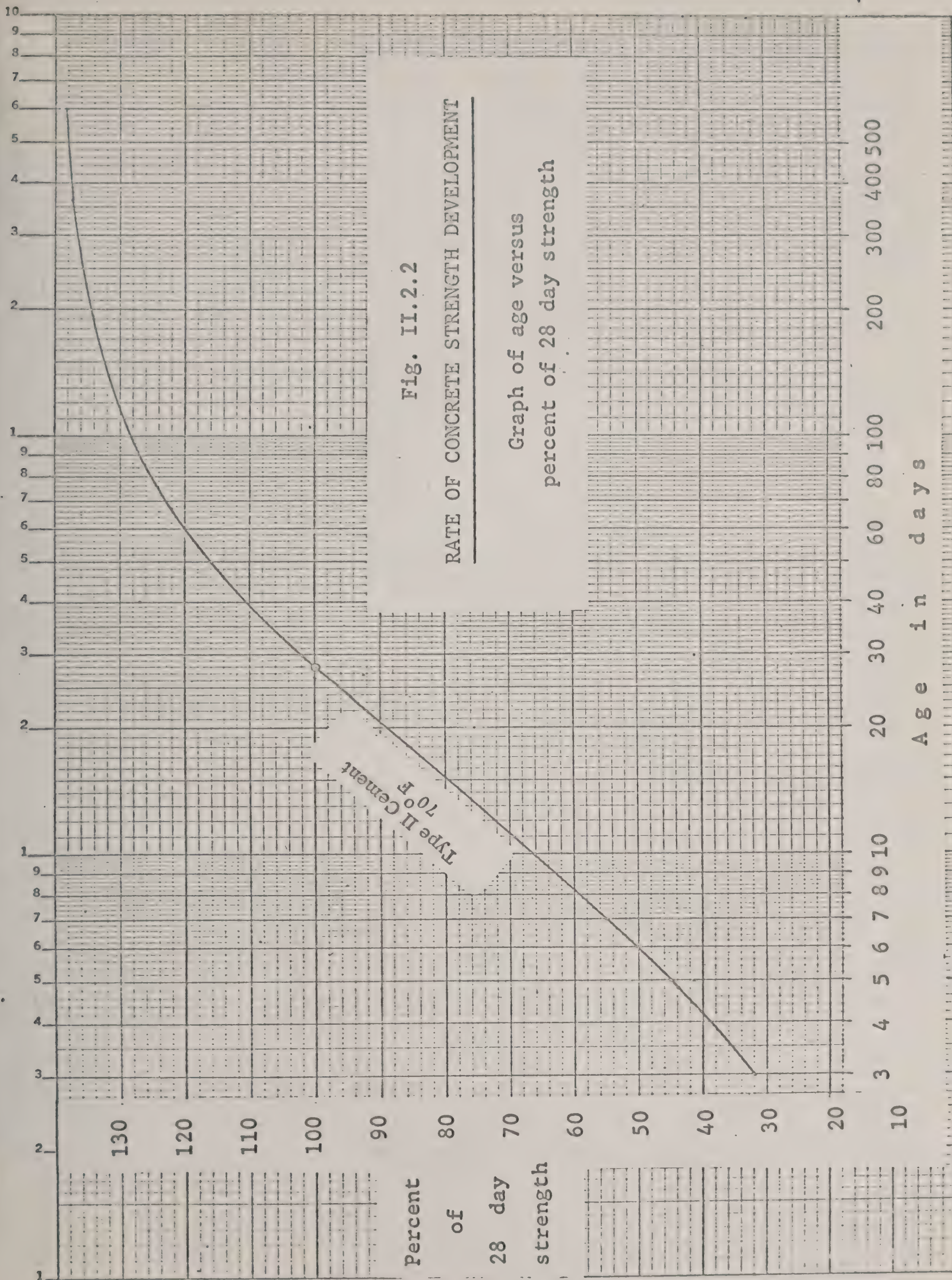


Figure II.2.1s



GENERAL NOTES

TYPICAL DETAILS

A. GENERAL

1. READ STRUCTURAL DRAWINGS IN CONJUNCTION WITH SPECIFICATIONS AND OTHER CONTRACT DOCUMENTS.
2. ONLY PRINCIPAL DIMENSIONS ARE SHOWN ON THE STRUCTURAL DRAWINGS. BEFORE PROCEEDING WITH WORK, CHECK ALL THESE DIMENSIONS WITH THE ARCHITECTURAL, MECHANICAL AND ELECTRICAL DRAWINGS AND REPORT DISCREPANCIES TO THE ARCHITECT. REFER TO THE ARCHITECTURAL AND OTHER DRAWINGS FOR ALL DIMENSIONS, INCLUDING LOCATIONS AND DIMENSIONS OF OPENINGS AND SLEEVES NOT SHOWN ON THE STRUCTURAL DRAWINGS.
3. PROVIDE PITS, BASES, TRENCHES, DEPRESSIONS, GROOVES AND CHAMFERS NOT INDICATED ON STRUCTURAL DRAWINGS. SEE ARCHITECTURAL, MECHANICAL AND ELECTRICAL DRAWINGS FOR DETAILS.
4. DESIGN LIVE LOADS TO THE LOADS FOR WHICH THE STRUCTURE IS DESIGNED OTHER THAN THE WEIGHT OF THE FINISHED BUILDING ARE SHOWN UNDER THE PLAN OF EACH PORTION OF THE STRUCTURE. THESE LOADS SHALL NOT BE EXCEEDED DURING CONSTRUCTION.
5. SEE ALSO THE FOLLOWING TYPICAL DETAIL SHEETS CONTAINED IN THE SPECIFICATIONS:

1. FOOTINGS
2. WALL AND PIT DETAILS
3. TWO WAY SLABS
4. FLAT SLAB WITHOUT DROPS
5. BAR CUTS AND BENDS FOR BEAMS AND JOISTS
6. TIED CONCRETE COLUMNS
7. SPIRAL CONCRETE COLUMNS
8. ARRANGEMENTS OF TIES IN COLUMNS
9. STEEL LINTELS
10. CONCRETE BLOCK LINTELS
11. FLAT SLAB WITH DROPS
12. ONE WAY SLAB WITH STRAIGHT BARS AND TEMPERATURE BARS
13. ABBREVIATIONS

B. MATERIAL

CONCRETE	LOCATION	COMPREHENSIVE STRENGTH	SLUMP	ENTRAINED AIR	REMARKS
FOOTINGS		4000	3" ±		
SLAB ON GRADE		3000	2" ±		
BEAMS AND WALLS		3000	2" ±		
ALL OTHER CONCRETE		3000	2" ±		

THE STRENGTH NOTED IS TO BE THE ULTIMATE COMPRESSIVE STRENGTH AT 28 DAYS.

C. REINFORCING

LOCATION	GRADE	MIN YIELD STRESS	REMARKS
SLAB ON GRADE		56 000	WELDED WIRE FABRIC
TIES & STIRRUPS	INTERMEDIATE	40 000	
ALL OTHER	1422	60 000	

STRUCTURAL STEEL SHALL BE NEW STRUCTURAL CARBON STEEL WITH DESIGNATION A36.

D. FOUNDATIONS

1. FOUND ALL FOOTINGS AND UNDERPINNING ON NATURALLY CONSOLIDATED UNDISTURBED SOIL CAPABLE OF SUSTAINING 10 TONS PER SQUARE FOOT, OR ON SOUND UNDISTURBED ROCK BELOW EL. 187.0 AT 25 TONS PER SQUARE FOOT.
2. BASED ON THE INFORMATION OBTAINED FROM THE SOIL REPORT IT IS PRESUMED THAT THESE CONDITIONS WILL BE FULFILLED AT THE FOOTING ELEVATIONS SHOWN ON THE DRAWINGS. IF IT IS FOUND THAT THESE CONDITIONS ARE NOT FULFILLED OR IF BEDROCK EXISTS AT FOUNDING ELEVATIONS ABOVE EL. 187.0, THE ARCHITECT SHALL BE INFORMED AND THE CONTRACTOR SHALL ALTER THE TYPE OR FOUNDING ELEVATION OF THE FOOTING, AS DIRECTED BY THE ARCHITECT.
3. FOUND FOOTINGS WHICH ARE EXPOSED TO FREEZING WEATHER A MINIMUM OF 4'0" BELOW THE FINISHED GRADE.
4. THE LINE OF SLOPE BETWEEN ADJACENT FOOTINGS OR EXCAVATIONS OR ALONG STEPPED FOOTINGS SHALL NOT EXCEED A RISE OF 7 IN A RUN OF 10.
5. DO NOT PLACE BACKFILL AGAINST WALLS RETAINING EARTH (OTHER THAN CANTILEVER WALLS) UNTIL THE FLOOR CONSTRUCTION AT TOP AND BOTTOM OF THE WALL IS POURED AND SET.
6. CARRY OUT BACKFILLING AGAINST FOUNDATION WALLS WHERE GRADE SIDES IN SUCH A MANNER THAT THE LEVEL OF BACKFILLING ON ONE SIDE OF THE WALL IS NEVER MORE THAN 1'6" DIFFERENT FROM THE LEVEL ON THE OTHER SIDE.
7. DURING FREEZING WEATHER PREVENT THE SOIL OR ROCK ADJACENT TO AND BENEATH ALL FOOTINGS FROM FREEZING.
8. NO FOOTINGS SHALL BE POURED PRIOR TO THE ARCHITECT'S APPROVAL OF THE FOUNDING CONDITION.

E. SLAB ON GRADE

1. PLACE SLABS ON GRADE ON MATERIAL CAPABLE OF SUPPORTING 600 P.S.F. WITHOUT SETTLEMENT RELATIVE TO THE BUILDING FOOTINGS.
2. FOR THICKNESS OF SLAB ON GRADE SEE FOUNDATION PLAN.
3. SEE ARCHITECTURAL DRAWINGS FOR DEPRESSIONS IN SLAB AND MAINTAIN SLAB THICKNESS SHOWN IN ALL CASES.

F. CONCRETE AND REINFORCING

1. CONCRETE COVER TO REINFORCING:
 - a) ALL CONCRETE POURED AGAINST EARTH OR ROCK
 - b) ALL CONCRETE POURED IN FORMS BUT EXPOSED TO EARTH OR WEATHER:
 - i) BARS LARGER THAN #5 IN WALLS AND SLABS, AND MAIN BARS IN BEAMS, GIRDERS AND COLUMNS
 - ii) BARS #5 AND SMALLER
 - c) CONCRETE PAGES NOT EXPOSED TO EARTH OR WEATHER:
 - i) SLABS AND WALLS
 - ii) BEAMS, GIRDERS AND COLUMNS TO TIE OF STIRRUPS
2. MINIMUM CLEAR DISTANCE BETWEEN PARALLEL BARS SHALL BE THE GREATEST OF THE FOLLOWING:
 - a) 1 1/2 TIMES BAR DIAMETER
 - b) 1 1/2 TIMES MAXIMUM SIZE OF AGGREGATE
 - c) 1" MINIMUM
3. LAPS FOR CONTINUOUS DEFORMED BARS SHALL BE 24 DIAMETERS UNLESS NOTED ON DRAWINGS. LAPS FOR WELDED WIRE FABRIC SHALL BE 6" AT ENDS AND EDGES.
4. ALL BOWELS INCLUDING COLUMN BOWELS SHALL HAVE A MINIMUM EMBEDMENT OF 24 DIAMETERS OR 1'6", EXCEPT THAT BOWELS FROM WALLS TO SLABS SHALL HAVE AN EMBEDMENT OF 2'0" UNLESS NOTED.
5. PROVIDE BOWELS TO WALLS AND COLUMNS SIMILAR IN SIZE, NUMBER AND SPACING TO THE VERTICAL STEEL IN THE WALL OR COLUMN, UNLESS NOTED.

G. COAT'D

1. WHERE REINFORCING IN BEAMS OR WALLS IS PLACED IN 2 OR MORE PLACES, PROVIDE 1" SPACER BARS PLACED NOT MORE THAN 60 DIAMETERS OF THE LONGITUDINAL STEEL SUPPORTED.
2. CONSTRUCTION JOINTS:
 - a) HORIZONTAL CONSTRUCTION JOINTS SHALL NOT BE MADE IN NEARLY VERTICAL BEAMS OR APPROVED BY THE ARCHITECT.
 - b) CONSTRUCTION JOINTS MAY BE MADE ONLY AT MIDSPAN OF BEAMS OR SLABS UNLESS SHOWN OR DIRECTED AND THEIR LOCATIONS SHALL BE APPROVED BY THE ARCHITECT.
 - c) KEYS AT CONSTRUCTION JOINTS SHALL BE 2" x 4" UNLESS NOTED.
 - d) NO SLEEVES TO BE PLACED HORIZONTALLY OR VERTICALLY IN BEAMS UNLESS APPROVED BY THE ARCHITECT UNLESS SHOWN ON STRUCTURAL DRAWINGS.
 - e) NO OPENINGS SHALL BE MADE IN FLAT SLAB COLUMNS UNLESS SHOWN.
 - f) MAXIMUM OPENING SIZE IN ONE WAY AND TWO WAY SLABS SHALL BE 2' SQUARE UNLESS SHOWN OR APPROVED BY THE ARCHITECT.
 - g) PROVIDE DOVETAIL ANCHOR SLOTS AT LOCATED AND DETAILS ON ARCHITECTURAL DRAWINGS.

H. STRUCTURAL STEEL

1. PROVIDE MINIMUM BEARING OF 3" FOR ALL STEEL BEAMS BEARING ON MASONRY AND A MINIMUM OF 4" FOR STRUCTURAL STEEL UNLESS NOTED.
2. CENTRE BEARING PLATES UNDER BEAMS UNLESS NOTED.
3. ALL STRUCTURAL STEEL IN DIRECT CONTACT WITH CONCRETE IS TO REMAIN UNPAINTED.

I. BEARING ON MASONRY

1. PROVIDE A MINIMUM LENGTH AND DEPTH OF 3' OF SOLID MASONRY BEARING UNDER ALL STEEL, CONCRETE OR REINFORCED MASONRY LINTELS.
2. UNDER STEEL AND CONCRETE BEAMS PROVIDE A 1/4" DEEP SOLID MASONRY PAD PROJECTING A MINIMUM OF 8" BEYOND THE EDGES OF BASE PLATES, UNLESS NOTED.
3. PROVIDE SOLID MASONRY FILL BUILT TIGHT INTO WEBS OF ALL WALL BEARING BEAMS AT THEIR POINTS OF BEARING.

J. LINTELS

1. PROVIDE LINTELS OVER ALL OPENINGS OR RECESSES IN MASONRY WALLS, INCLUDING THOSE FOR MECHANICAL AND ELECTRICAL SERVICES OR EQUIPMENT.

K. ULTIMATE STRENGTH DESIGN

1. THE STRUCTURAL FRAME OF THE BUILDING HAS BEEN DESIGNED USING THE ULTIMATE STRENGTH DESIGN METHOD AS DEFINED IN THE A.C.I. 318-63 CODE.

L. WIND FORCE

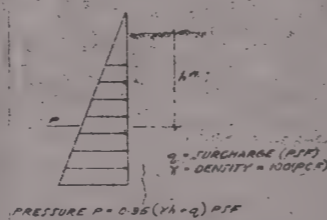
1. THE STRUCTURE HAS BEEN DESIGNED TO WITHSTAND WIND FORCES AS DEFINED IN THE 1973 BUILDING CODE. THE FORCES ARE RESISTED BY THE CORE WALL WHICH HAVE BEEN DEFINED AT COUPLED JHEAR WALL ANCHORS BETWEEN GROUND FLOOR AND FOUNDATION.

M. EXPOSED CONCRETE

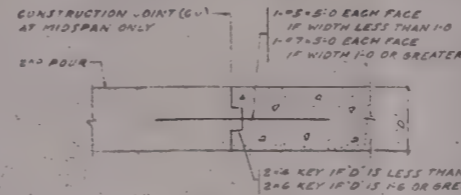
1. WHERE CONSTRUCTION JOINTS ARE SHOWN, NO OTHER LOCATION WILL BE PERMITTED.
2. OTHER CONSTRUCTION JOINTS WHICH MAY BE REQUIRED SHALL BE MADE ONLY AT LOCATIONS APPROVED BY THE ARCHITECT.
3. THE LOCATION OF ALL CONTROL JOINTS AND FORMITIES SHALL BE TO THE ARCHITECT'S APPROVAL, AND MUST BE COORDINATED WITH ARCHITECTURAL FINISH.

N. TOWER CRANE

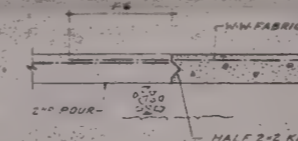
1. LOCATION OF TOWER CRANE SHALL BE TO ARCHITECT'S APPROVAL. CRANE SHALL BE SUPPORTED FOR VERTICAL AND HORIZONTAL FORCES SPECIFIED BY THE MANUFACTURER. SUPPORT DETAILS MUST BE TO ARCHITECT'S APPROVAL.



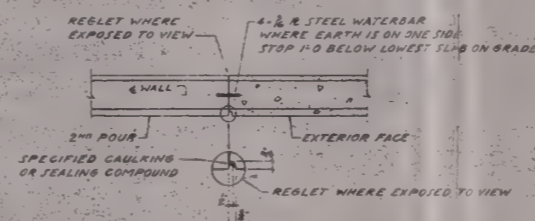
ASSUMED EARTH PRESSURES AGAINST RETAINING WALLS



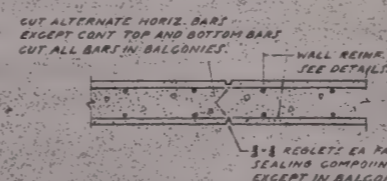
CONSTRUCTION JOINT IN BEAM



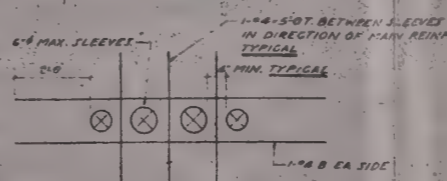
CONSTRUCTION JOINT IN SLAB ON GRADE



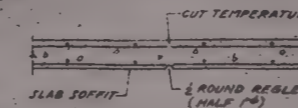
VERTICAL CONSTRUCTION JOINT IN WALLS



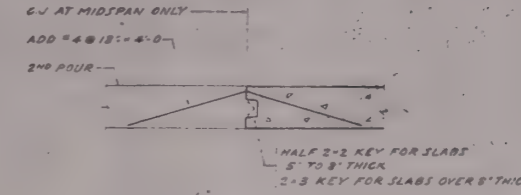
VERTICAL CONTROL JOINT IN WALLS



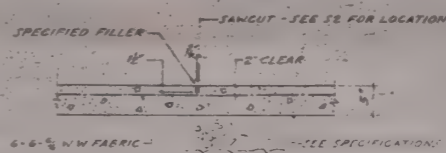
REINFORCING AT SLEEVES IN SLABS



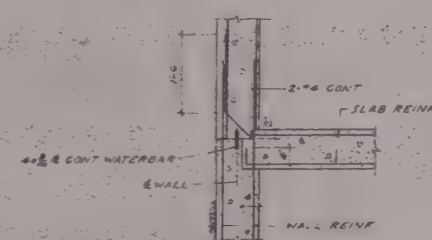
CONTROL JOINT IN SLABS



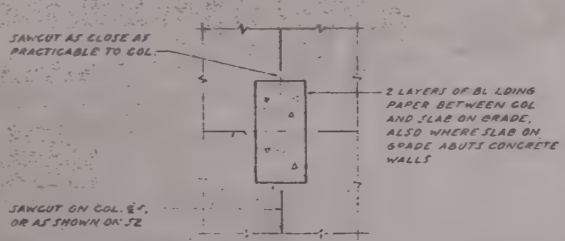
CONSTRUCTION JOINT IN SLAB



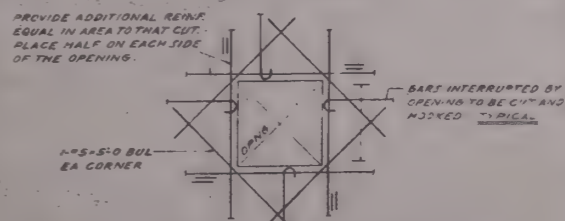
SLAB ON GRADE



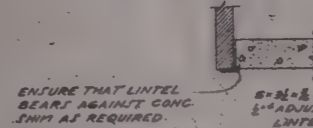
HORIZONTAL CONSTRUCTION JOINT IN EXTERIOR BASEMENT WALLS



SLAB ON GRADE AT COLUMNS



REINFORCING AT OPENINGS IN SLABS, UNLESS NOTED.



ENSURE THAT LINTEL BEARS AGAINST CONC. SWIFT AS REQUIRED.

BRICK SUPPORT ANGLES

MS YOLLES & ASSOCIATES CONSULTING STRUCTURAL ENGINEERS

NO.	REVISION	DATE	BY

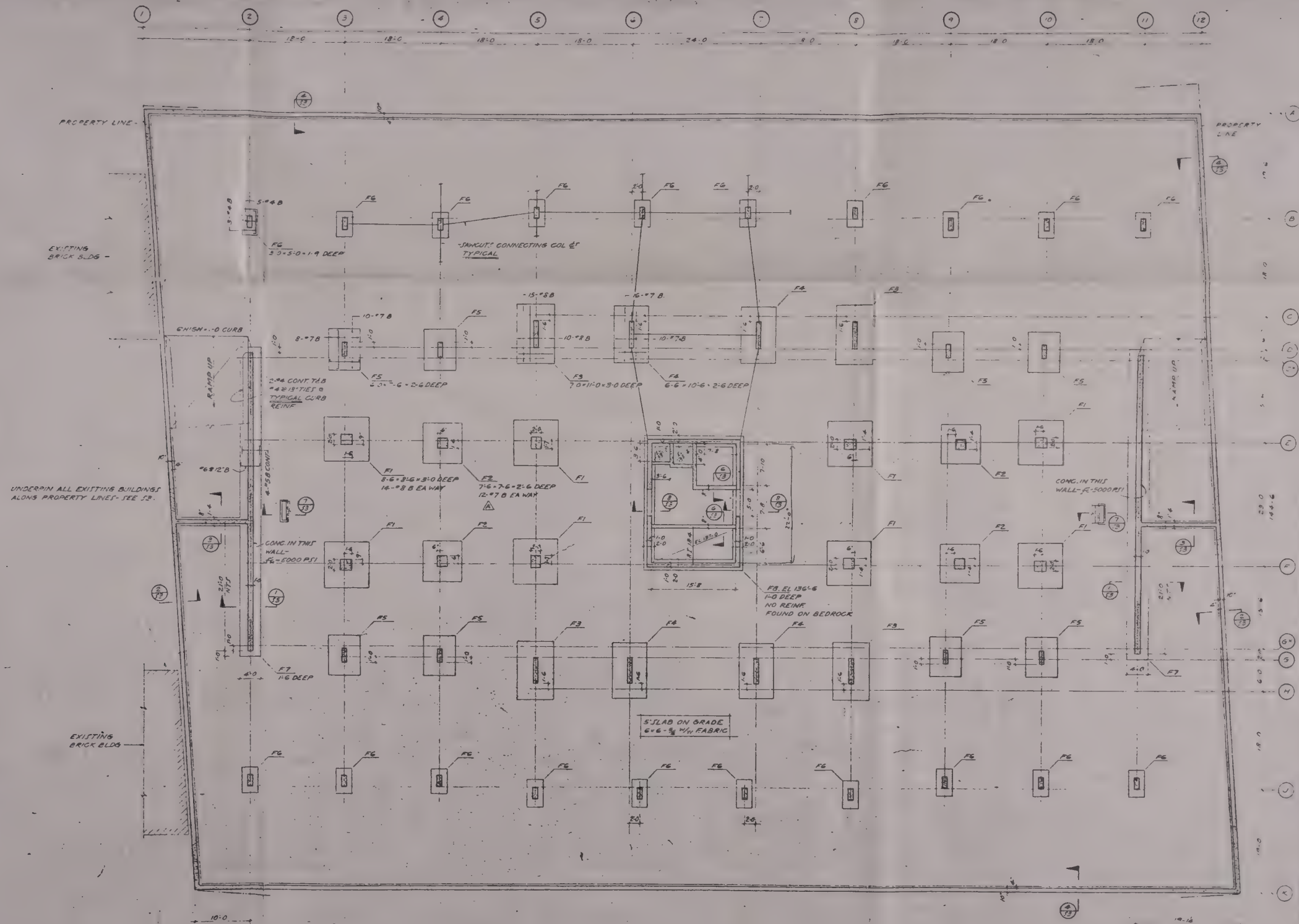
THE GENERAL CONTRACTOR SHALL CHECK AND VERIFY ALL DIMENSIONS AND REPORT ALL ERRORS AND OMISSIONS TO THE ARCHITECT'S DRAWINGS. MUST NOT BE SCALED.

THIS DRAWING SHALL NOT BE USED FOR CONSTRUCTION PURPOSES UNLESS SIGNED BY THE ARCHITECT.

DATE: _____ SIGNATURE: _____

GENERAL NOTES
TYPICAL DETAILS
2000 COMMONWEALTH AVE.
CHESTNUT HILL BOSTON
WEBB ZERAPA MENKES ARCHITECTS
MONTREAL TORONTO

DRAWN BY	CHECKED BY	PROJECT NO.	DWG. NO.
DA	LLT		
SCALE	DATE		
	FEB 69	68073	S



FOUNDATION PLAN

1. SEE ARCHITECTS DRAWING FOR ELEVATIONS AT TOP OF SLAB.
2. CENTRE ALL FOOTINGS UNDER COLUMNS AND WALLS EXCEPT AS SHOWN.
3. TOP OF FOOTINGS IS AT EL 161-3 EXCEPT AS SHOWN.
4. SEE DWG J3 FOR FOOTING DETAILS.
5. SEE ARCHITECTURAL DRAWINGS FOR SLOPES TO DRAINS.
6. SEE TYPICAL DETAIL SHEET NO 2 FOR PIT DETAILS.
7. SEE ARCHITECTURAL DRAWING AT FOR SOIL BORING INFORMATION.

M5 VOLLES & ASSOCIATES
CONSULTING STRUCTURAL ENGINEERS

A FOOTING F2 REVISED 20 5 69 LLT

THE GENERAL CONTRACTOR SHALL CHECK AND VERIFY ALL DIMENSIONS AND REPORT ALL ERRORS AND OMISSIONS TO THE ARCHITECTS. DRAWINGS MUST NOT BE SCALED.

THIS DRAWING SHALL NOT BE USED FOR CONSTRUCTION PURPOSES UNLESS SIGNED BY THE ARCHITECT.

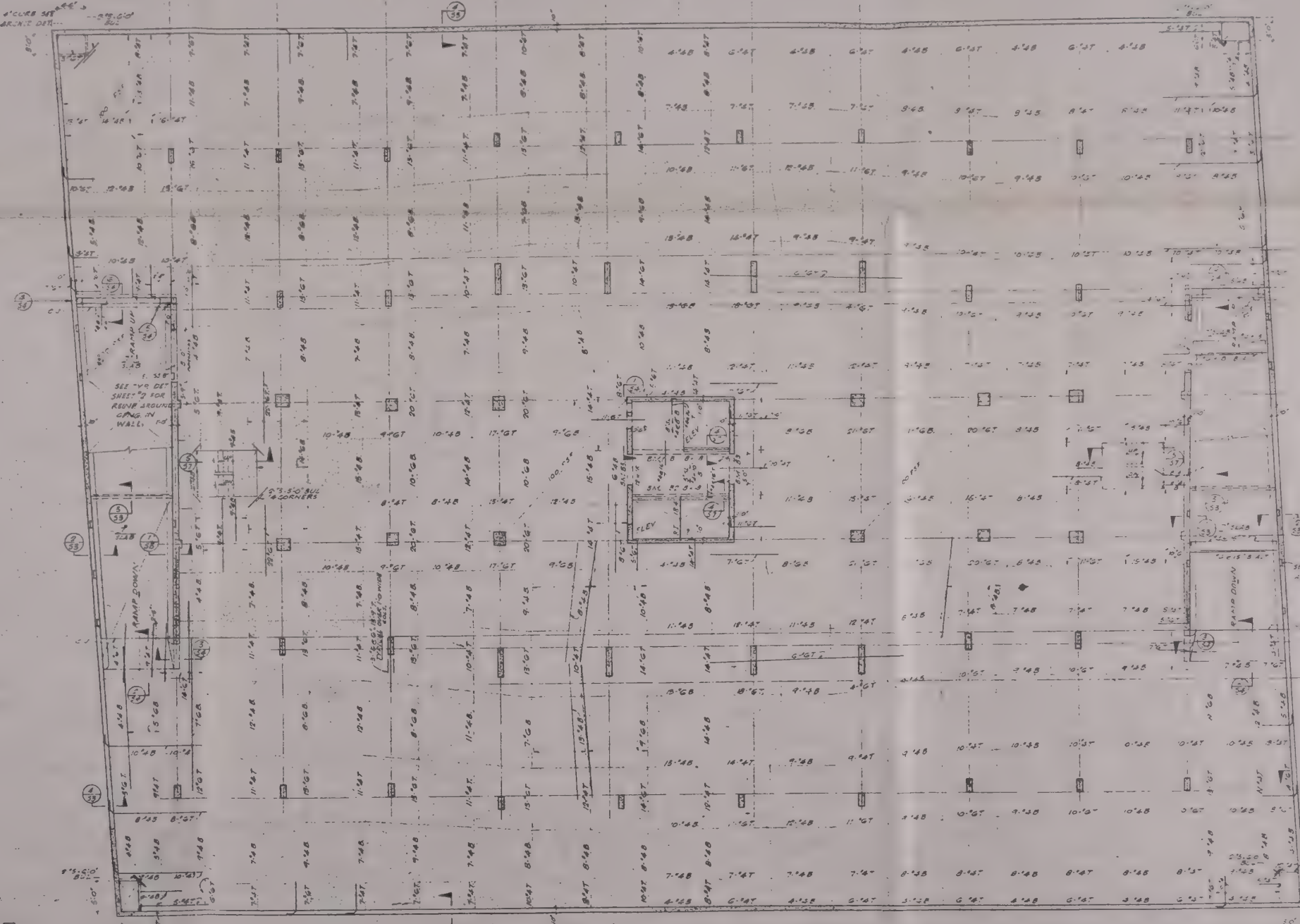
DATE SIGNATURE

FOUNDATION PLAN

2000 COMMONWEALTH AVE.
CHESTNUT HILL BOSTON

WEBB ZERFA MENKES
ARCHITECTS
MONTREAL TORONTO

DRAWN BY DA CHECKED BY LLT PROJECT NO DWG NO
SCALE 1/8"=1'-0" DATE 69 68073 5-2



1ST BASEMENT FRAMING PLAN

- 1 TOP OF STRUCTURAL SLAB IS 0" BELOW FINISHED FLOOR EXCEPT AS CROSSED AND NOTED.
- 2 STRUCTURAL SLAB IS 4" THICK EXCEPT AS SHOWN.
- 3 LIVE LOAD IS 75 PSF EXCEPT AS CROSSED AND NOTED. PARTITIONS CONSIDERED AS PER ARCHITECTURAL LAYOUT.
- 4 REINFORCING SYMMETRICAL ABOUT 2" EXCEPT AS SHOWN.
- 5 SEE ARCHITECTURAL DRAWINGS FOR TOP OF SLAB ELEVATIONS. MAINTAIN SLAB THICKNESS AT SLOPES TO DRAINS.

BAR PLACING ORDER

1. BOTTOM BARS N-S
2. Do Do E-W
3. TOP Do E-W
4. Do Do N-S

MS YOLLES & ASSOCIATES
CONSULTING STRUCTURAL ENGINEERS

THE GENERAL CONTRACTOR SHALL CHECK AND VERIFY ALL DIMENSIONS AND REPORT ALL ERRORS AND OMISSIONS TO THE ARCHITECTS. DRAWINGS MUST NOT BE SCALED.

THIS DRAWING SHALL NOT BE USED FOR CONSTRUCTION PURPOSES UNLESS SIGNED BY THE ARCHITECT

DATE _____ SIGNATURE _____

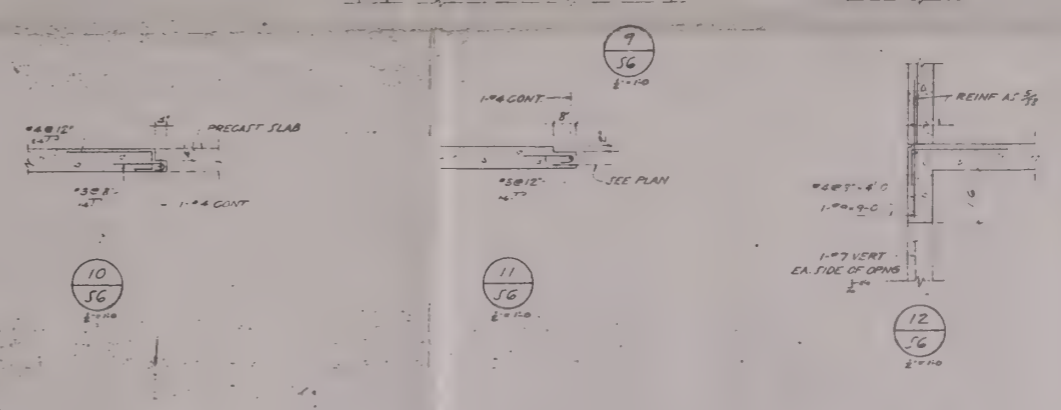
FIRST BASEMENT
FRAMING PLAN

2000 COMMONWEALTH AVE.
CHESTNUT HILL BOSTON

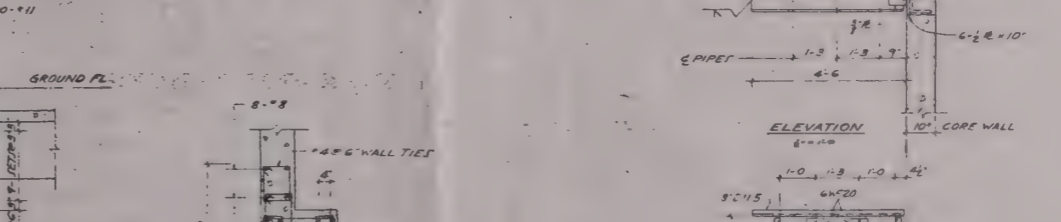
WEBB ZERFA MENKES
ARCHITECTS
MONTREAL TORONTO

DRAWN BY BM	CHECKED BY LLT	PROJECT NO.	DWG. NO.
SCALE NOTED	DATE JUN 68	68073	S: 4

DRAWN BY B M	CHECKED BY L L T	PROJECT NO.	DWG. NO.
SCALE	DATE		

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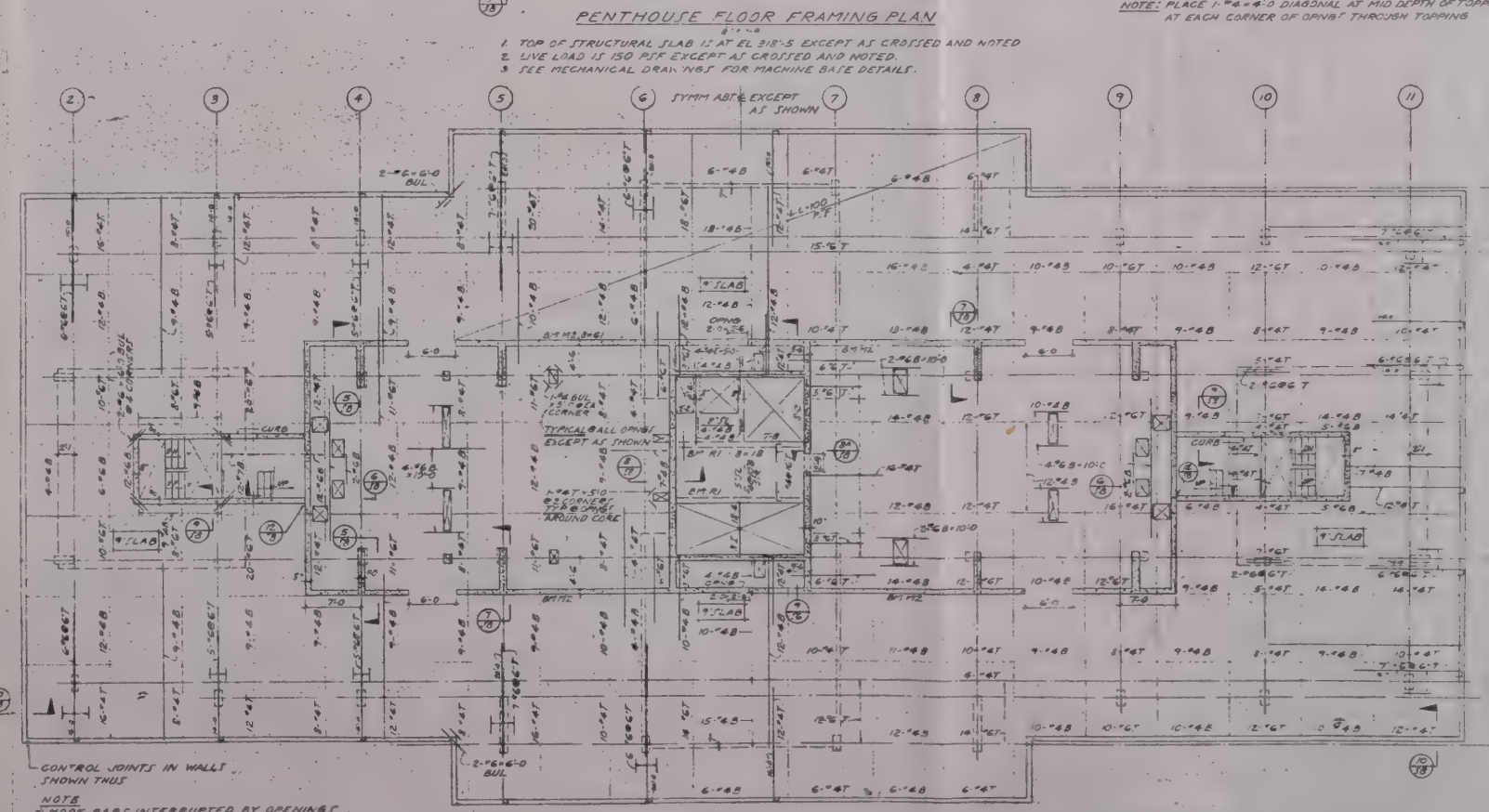
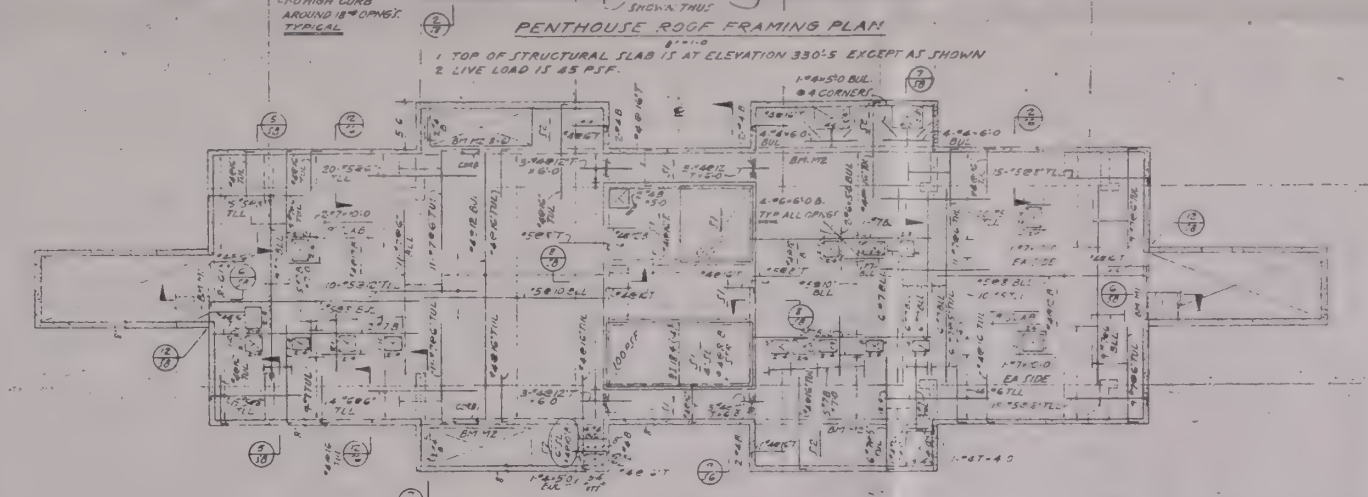
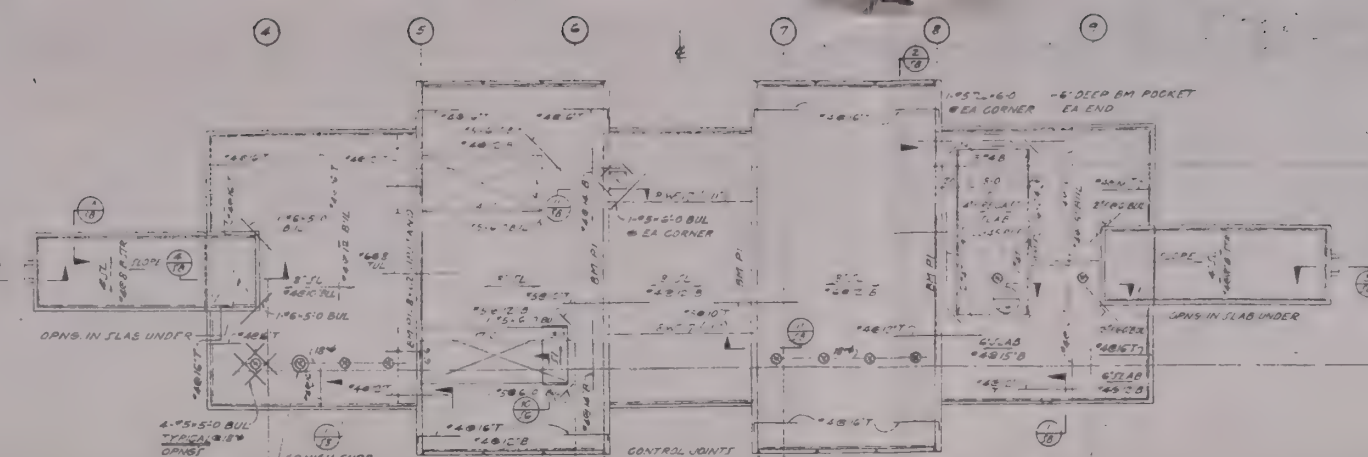
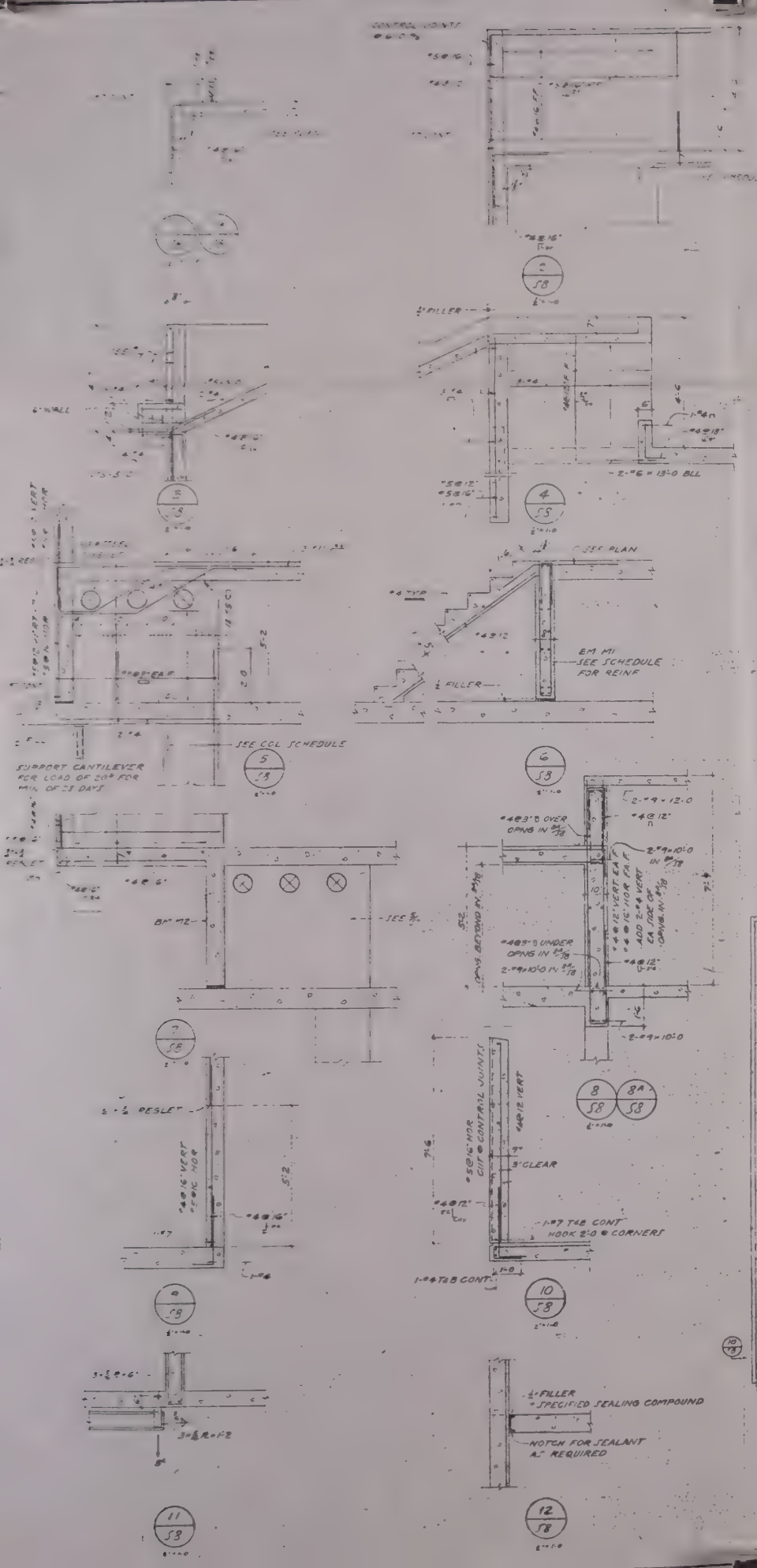
A technical drawing showing a cross-section of a mechanical assembly. It includes various dimension lines and labels such as '80', '10', '15', '20', '30', '40', '50', '60', '70', '80', '90', '100', '110', '120', '130', '140', '150', '160', '170', '180', '190', '200', '210', '220', '230', '240', '250', '260', '270', '280', '290', '300', '310', '320', '330', '340', '350', '360', '370', '380', '390', '400', '410', '420', '430', '440', '450', '460', '470', '480', '490', '500', '510', '520', '530', '540', '550', '560', '570', '580', '590', '600', '610', '620', '630', '640', '650', '660', '670', '680', '690', '700', '710', '720', '730', '740', '750', '760', '770', '780', '790', '800', '810', '820', '830', '840', '850', '860', '870', '880', '890', '900', '910', '920', '930', '940', '950', '960', '970', '980', '990'. The drawing shows a complex arrangement of parts with various geometric shapes and features.



PIPE SUPPORT BRACKET DETAILS
SEE MECH DWG# FOR PIPE DIA'S

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SCALE NOTED	DATE FEB 69	68073	S-6

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SCALE NOTED	DATE FEB 69	68073	S-7



MSYOLLES & ASSOCIATES
CONSULTING STRUCTURAL ENGINEERS

NO.	REVISION	DATE	BY

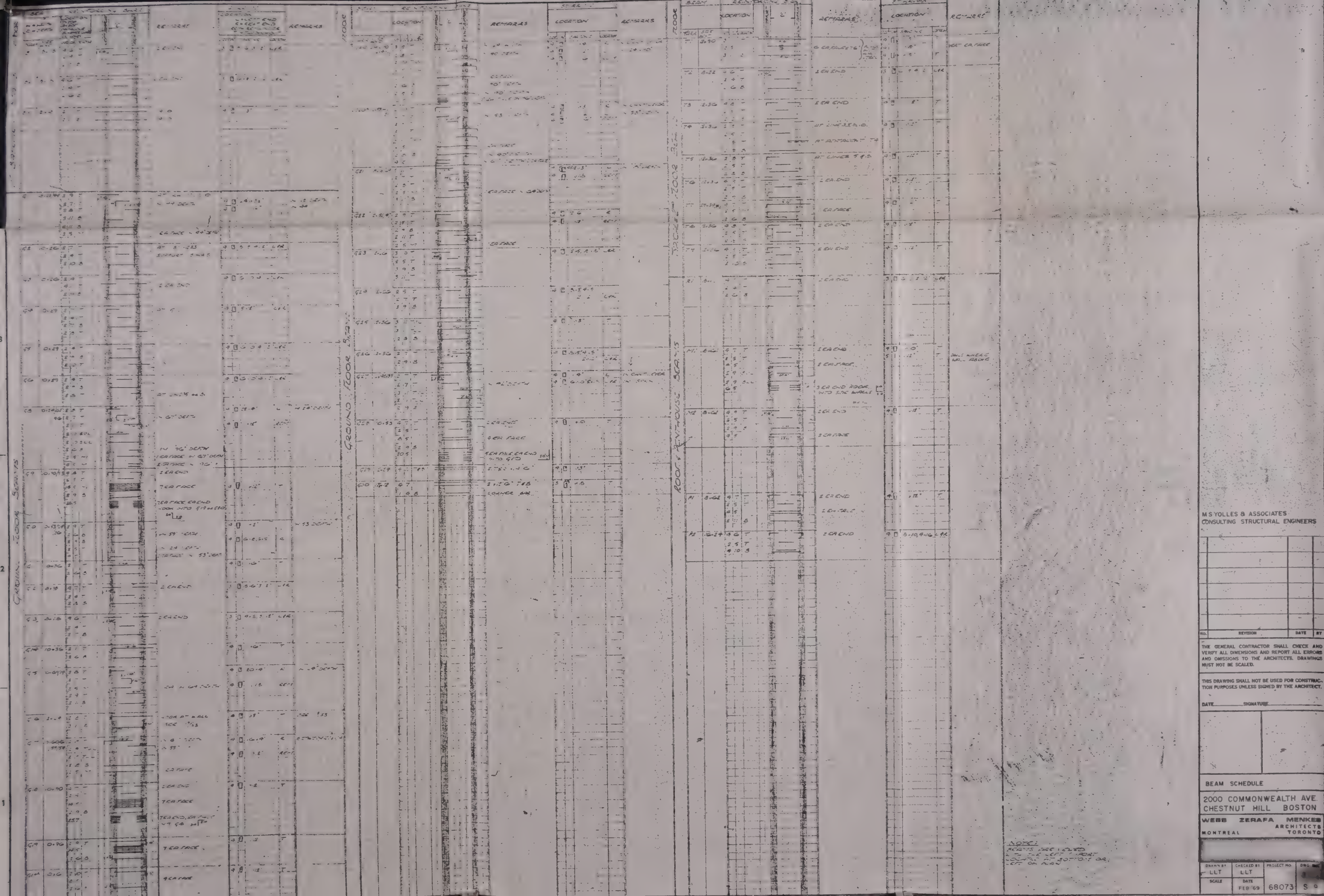
THE GENERAL CONTRACTOR SHALL CHECK AND VERIFY ALL DIMENSIONS AND REPORT ALL ERRORS AND OMISSIONS TO THE ARCHITECTS. DRAWINGS MUST NOT BE SCALED.

THIS DRAWING SHALL NOT BE USED FOR CONSTRUCTION PURPOSES UNLESS SIGNED BY THE ARCHITECT

DATE _____ SIGNATURE _____

PENTHOUSE AND MAIN ROOF FRAMING PLANS
2000 COMMONWEALTH AVE
CHESTNUT HILL BOSTON
WEBB ZERAFA MENKES ARCHITECTS
MONTREAL TORONTO

DRAWN BY DA	CHECKED BY LLT	PROJECT NO. 100	DWG NO. S-8
SCALE NOTED	DATE FEB 89	68073	



THE BUILDING COLLAPSE AT
2000 COMMONWEALTH AVENUE
BOSTON, MASSACHUSETTS

on

January 25, 1971

REPORT

OF

THE MAYOR'S INVESTIGATING COMMISSION

APPENDIX II. 4

STRUCTURAL DESIGN DOCUMENTS

JUNE 1971

APPENDIX II. 4

STRUCTURAL DESIGN DOCUMENTS

This appendix contains the structural design documents which were made available to the Commission. Included are Division 3, Section 3A, "Plain and Reinforced Concrete," of the designers' specifications, and structural plans S-1 through S-9, dated February 1969. These documents were the basis of the design review in Part II, Section 4.

The specifications were furnished to the Commission by Thomson, Rogers, Barristers and Solicitors, 120 Adelaide Street West, Toronto 110, Ontario, Canada, attorneys representing M. S. Yolles & Associates. The structural plans were provided by the City of Boston Fire Department. This set of plans was a duplicate copy of a misplaced set which previously had been on file in the Building Department.

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by

The City of Boston, Massachusetts

D I V I S I O N 3 C O N C R E T E
S E C T I O N 3 A P L A I N A N D R E I N F O R C E D C O N C R E T E

(a) Read and conform to the requirements specified in Division 1.

1
SCOPE

(b) Provide labour, materials, plant and equipment to complete the plain and reinforced concrete work indicated on the drawings and specified herein.

(a) Reinforcing Steel

2
SHOP DRAWINGS

1. Opening Information

- (i) Prior to detailing reinforcement, prepare for the Architects review, drawings of the structure showing formed holes, recesses and sleeving required under all Divisions.
- (ii) Completely dimension all openings, recesses and sleeves and relate to suitable grid lines and elevation datum.

2. Detailing

- (i) After Architect has reviewed and returned opening drawings prepare reinforcement placing drawings and bar lists for every portion of the structure, taking into account all openings and recesses.
- (ii) Prepare placing drawings to a minimum scale of $\frac{1}{4}$ inch = 1 foot, in a clear, complete manner that will permit placing of reinforcement to be performed without reference to structural drawings.
- (iii) Detail reinforcement in accordance with requirements of drawings, typical detail sheets, and detailing standards contained in ACI 315.
- (iv) Except as noted otherwise on the drawings provide standard hooks on reinforcement in accordance with ACI 315. Less than standard hooks may only be used in locations approved by the Architect.
- (v) Offset vertical bars in column at least one bar diameter at lapped splices.
- (vi) Amongst other items, include on placing drawings the following:

identification of each bar with a code mark on placing drawings and on corresponding bar lists.

2
SHOP DRAWINGS
(Cont'd.)

detail sections to fully illustrate placement of reinforcement at areas such as openings, change of levels, spandrels, stairs and wherever else required.

large scale detail sections at areas of congested steel such as at intersections of beams and columns, column splices or wherever else required.

placing sequence for reinforcement such as intersections of beams to beams, joists to beams, slabs to beams, and within flat and two way slabs.

minimum clearances between reinforcement and minimum concrete protection to reinforcement on each placing drawing.

location of each bar relative to a building or grid line which can be identified on the formwork.

location and extension of dowels.

location, number and type of support accessories.

(a) Certificates

3
CERTIFICATES/
INSPECTION
AND TESTING

1. Prior to beginning work, provide the following certificates prepared by an approved inspection company. The cost of these certificates shall be borne by the contractor.

(i) Aggregates: Certification that coarse and fine aggregates proposed for the work comply with specification requirements.

(ii) Cement: Results of physical and chemical tests required by ASTM C-150. Include the specific surface in square centimeters per gram using the Blaine air permeability method, and false set tests on samples in accordance with the procedure set out in ASTM C.359 and limits as follows:

initial penetration	40 millimeters minimum
11 minute penetration	15 millimeters minimum

(iii) Concrete: The mix proposed for each class of concrete giving proportions by dry weight of cement, coarse and fine aggregate, type and amount of admixture or air entraining agents, and water-

Slump: A minimum of one slump test will be made for every compressive strength test made.

3
CERTIFICATE
INSPECTION
AND TESTING
(Cont'd.)

(iii) Air Content; One air content determination will be made from each 50 cubic yards of air entrained concrete placed or not less than one test for each class of air entrained concrete placed on any one day.

(iv) Tests on Reinforcing Steel:

A series of specimens for each grade and size of reinforcing steel contained in any 100 tons of steel shipped will be tested. A series of tests shall include 2 bars for each test required of each size and grade of steel used. Reinforcing steel tests will be made in accordance with ASTM standards.

3. Inspection of soil

Soil at footing founding elevations will be inspected.

4. Give the Architect a minimum of 36 hours advance notice so as to afford him reasonable opportunity to inspect the work for compliance with contract requirements. Failure to meet this requirement may be a cause for the Architect to classify the work as defective.

5. Samples and Assistance

Provide the following, the cost of which shall be borne by the Contractor.

(i) Specimens for Testing:

Supply samples of all materials required for testing.

Concrete Test Cylinders: Co-operate in the execution of the concrete cylinder testing programme. Furnish concrete required, protect specimens against injury and loss, assist in the sampling and storage of specimens.

(ii) Reinforcement:

Cut samples of reinforcing steel designated by the Architect from steel shipped to job site. Replace reinforcement cut or splice where permitted by the Architect. Maintain an adequate supply of representative steel to permit immediate

replacement of steel removed from the site as test specimens.

Cut samples of mechanical splices and welded reinforcement as directed by the Architect.

Replace mechanical splices and welded reinforcement cut out for testing.

3
CERTIFICATES/
INSPECTION
AND TESTING
(Cont'd.)

(iii) Assistance for Testing :

Assist the testing company or soils investigation firm to make their inspection or tests.

Provide the Architect access to the reinforcement fabricator's plant. Inform the Architect of the period during which fabrication will be undertaken.

(iv) Facilities for Testing:

Provide storage facilities for the initial 24 hours of site storage of laboratory cylinders and the site storage of field cured cylinders. The facilities shall meet the requirements stipulated in ASTM C31 and the approval of the Architect. Suitably equip the facility for storing laboratory cured cylinders with humidity and temperature control equipment and maximum-minimum thermometers. The facility shall be sufficiently large to handle the maximum number of cylinders required at one time. Provide sufficient storage facilities for job cured cylinders so that cylinders representing the various areas can be stored in locations representing the curing conditions of those areas. Move the job-cured cylinder storage facilities from area to area as the work progresses.

Provide a slump cone and tamping rod conforming to ASTM C31 for use by the Architect at the site.

Provide air entrainment testing apparatus conforming to ASTM C233 for use by the Architect at the site.

(a) Conform to the latest issue of the following standards:

1. American Welding Society (AWS)

D12 Recommended Practice for Welding Reinforcing Steel, Metal Inserts and Connections in Reinforced Concrete.

2. American Concrete Institute (ACI)

315 Standard Practice for Detailing Reinforced Concrete Structures.

4
STANDARDS
AND CODES

Report Number

56-49 Consolidation of Concrete

4
STANDARDS
AND
CODES
(Cont'd.)

- 347 Standard Recommended Practice for Concrete
- 318 Standard Building Code Requirements for Reinforced Concrete.

3. Concrete Reinforcing Steel Institute (CRSI)

CRSI - WCRSI Placing Reinforcing Bars

- 4. Conform to requirements of Building Code of the City of Boston and other applicable acts administered by any authority having jurisdiction.

(a) Cold Weather Concreting:

5
PROTECTION

1. General

- (i) Conform to recommendations of ACI 306 except as varied herein.
- (ii) Provide on hand and ready for use all equipment necessary for adequate protection and curing before concrete placement is begun.

2. Concrete Temperature & Protection Requirements:

- (i) When the air temperature is at or below 40°F, or when in the opinion of the Architect there is a probability of it falling to that limit during the placing period or within 24 hours:

Place concrete at a minimum temperature of 55°F when deposited in the forms.

Maintain all surfaces of concrete at a temperature of 55°F minimum and in a moist condition for seven days after placing.

- (ii) At the end of the protection period withdraw protection so as not to introduce excessive thermal stresses in the concrete and so that the drop in temperature of any portion of the concrete will be gradual and not in excess of 50°F in 24 hours.

3. Protection

- (i) Obtain protection by use of adequate supplementary insulation, by enclosing concrete surfaces with raised tarpaulins or by building a complete housing around concrete with a provision for heating housing when required.

- (ii) When outside temperature falls or may fall below 10°F during placing or during protection period, provide a complete housing of concrete work. Provide supplementary heat.
- (iii) When outside temperature falls or may fall below 25°F but not below 10°F during placing or during protection period, provide adequate enclosures of concrete work with tarpaulins or insulation. Provide supplementary heat.
- (iv) When outside temperature falls or may fall to 25°F during placing or during curing, provide adequate enclosure of concrete work with tarpaulins or insulation. Supplementary heat shall be in readiness.
- (v) Where fresh concrete is to be cast against existing concrete prevent the loss of heat by extending the protection for the fresh concrete at least 2 feet over the existing.
- (vi) Insulate, or enclose within the protective housing tie rods, reinforcement or structural steel which projects from the concrete being protected.
- (vii) Construct enclosures reasonably tight and safe for wind and snow loadings.
- (viii) Maintain housing, enclosures and supplementary heat in place for entire period of protection, except that sections may be temporarily removed as required to permit placing additional forms or concrete, provided the uncovered concrete is not permitted to freeze. Make up time lost from the required period of protection at the required temperature before protection is discontinued and removed.
- (ix) Insulation Protection :

A method approved by the Architect, of insulating forms without supplementary heat, may be substituted for protecting walls, columns, and slabs above ground.

Conform to the recommendations made in ACI-306-66 for insulation requirements and use.

Submit complete details of proposal including drawings and samples of insulating materials, to the Architect for review.

4. Temperature Records

5
PROTECTION
(Cont'd.)

- (i) Keep a record of the date, hour, outside air temperature and weather. Record temperatures at several points within the enclosure and on the concrete surface, corners and edges in sufficient number to show highest and lowest temperatures of concrete. Record maximum and minimum temperature readings in each 24 hour period.
- (ii) Record data in such a manner that the location of each reading and any conditions which might have an effect on the temperature are shown.
- (iii) Submit copies of temperature records to Architect weekly during cold weather.
- (iv) Preserve copy of this record for future reference.

5. Preparation Before Concreting

- (i) Remove ice, snow and frost and raise temperature of surfaces coming in contact with concrete above 40°F.
- (ii) Do not use calcium chloride or other salts for the removal of snow, ice and frost from concrete surfaces, forms, or reinforcing steel.
- (iii) Remove snow, ice and frost with steam jets or other means approved by the Architect.

6. Admixtures

- (i) Do not use salts, chemicals or other foreign materials in concrete without the approval of the Architect.

7. Curing

- (i) Humidify air within enclosed space and keep concrete and formwork continuously moist, if dry heat is used, for the entire protection period.
- (ii) Maintain the relative humidity of the air in the enclosed space at a minimum of 95% as measured by a wet and dry bulb thermometer.

8. Heating Units

- (i) Construct, place and adequately ventilate combustion type heaters so that carbon dioxide and other combustion gases do not accumulate or come in contact with surfaces of fresh concrete
- (ii) Dispose heating units to avoid heating concrete locally or drying it excessively. Avoid high temperature and dry heating within enclosures.

- (iii) Take particular care to maintain edges and corners of concrete at the required temperature owing to their greater vulnerability to freezing.

5
PROTECTION
(Cont'd.)

- (iv) Keep adequate fire fighting apparatus close to the enclosure and easily accessible.

- (v) Maintain constant attendance to ensure safe, continuous operation of heating units during the protection period.

9. Slabs On Grade

See clause 6.(p) of this Section for additional cold weather protection requirements for placing and finishing slabs on grade.

(b) Hot Weather Concreting

1. General

- (i) Conform to recommendations ACI 605 except as varied herein for protection of concrete and concrete operations during hot weather.

- (ii) Difficulties arising from high temperatures and rapid rates of evaporation are:

plastic shrinkage cracking
development of cold joints during a pour
inadequate consolidation
greater tendency of concrete to crack after hardening
difficulty in controlling slump and air content and
thus the workability of the concrete.

- (iii) Avoid these difficulties by advance planning and the use of special precautions.

2. Concrete Temperature As Placed

- (i) Do not place concrete having a temperature exceeding 90°F.

3. Precautions

- (i) When the ambient air temperature is at or above 80°F or when in the opinion of the Architect it may rise to that level, or when the combination of temperature, humidity, wind and exposure may result in rapid evaporation, adopt the following procedures:

(ii) Preparation Before Concreting

5
PROTECTION:
(Cont'd.)

Employ means to maintain concrete ingredients at as low temperatures as practical. The optimum temperature of concrete at time of placing is 60°F. Keep stockpiles of aggregates moist and shaded from the sun. Do not use cement having a temperature above 170°F.

Keep surfaces of conveying equipment and chutes cool and shaded from the sun before concreting. Spray with cool water immediately before concreting.

Sprinkle forms, subgrade, and reinforcement with cold water immediately before concreting.

(iii) Placing Concrete

Dispatch ready-mix trucks and organize work to keep mixing time to a minimum. Minimize exposure of mixing trucks to the hot sun while waiting.

Provide adequate personnel and organize work to keep placing time to a minimum.

Place concrete in layers thin enough and areas small enough so that the time interval is reduced and compaction will ensure complete union of adjacent portions.

Prevent surfaces from setting too rapidly, or plastic shrinkage occurring, with a fog spray, wet burlap or other suitable measures. Suitable vibration as long as the concrete will still become plastic under vibration, may be used to aid in the elimination of plastic shrinkage cracks.

(iv) Curing

Provide continuous moist curing during the first 24 hours after placement and prevent alternate wetting and drying during remainder of curing period.

If moist curing is not continued beyond 24 hours, cover the surfaces, while still damp, with a white pigmented curing compound.

With formed concrete, reliance shall not be placed on the forms alone to provide curing. Spray formwork with water to keep it tight and free from cracking.

(c) Protection of Freshly Placed Concrete

1. During the curing period:

(i) protect concrete from the harmful effects of sunshine, drying winds, rain, cold, heat or running water by use of adequate tarpaulins or other suitable materials. (Cont'd.)

5

PROTECTION

(ii) Protect concrete from damaging mechanical disturbances particularly load stresses, heavy shock and excessive vibration.

(d) Protection of Completed Work:

1. At all times during the work, protect architectural concrete exposed masonry and other exposed members from staining or becoming coated with concrete leakage, due to continuing concreting operations. Members which become coated may be classed as defective work by the Architect.
2. Protect exposed members from staining due to rusting of reinforcement projecting beyond construction joints.
3. Take suitable measures to prevent spalling and cracking damage occurring to the structure due to water freezing in expansion joints, small holes, slots, depressions and the like.

(a) Workmanship:

1. Conform to ACI 318 unless otherwise specified.

6

APPLICATION/
INSTALLATION
AND ERECTION

(b) Design of Concrete:

1. Design of Mixture:

- (i) Design the mix in accordance with ACI 318 so the concrete will be homogeneous, uniformly workable, readily placeable into corners and angles of forms and around reinforcement by methods of placing and consolidation employed on the work, but without permitting materials to segregate or excessive free water to collect on the surface. The concrete when hardened shall have the required strength, durability resistance to abrasion, watertightness, appearances, and other qualities specified or noted.
- (ii) Add an approved water reducing admixture, conforming to ASTM C 494 to all concrete with the exception of concrete for slabs on grade. Water reducing admixtures shall not contain more than 0.1% maximum chloride content measured as a percent of weight of cement on a dry solids basis.
- (iii) The maximum water-cement ratio of concrete exposed to weather for slabs on grade or concrete which will be exposed to alternate freezing and thawing (such as walks, curbs, etc.) shall be 0.49 by weight.

(iv) No calcium chloride shall be used in any concrete.

(v) The strength and slump of the concrete for various members shall be as shown on drawings.

(vi) Concrete in the following members shall contain entrained air (entrapped + entrained) controlled at the following percentages:

<u>Member</u>	<u>% Entrained Air</u>
Concrete walks, curbs, pavements and the like	6% \pm 1%
Other concrete exposed to the elements	5% \pm 1%

2. Strength Requirements

(i) The average of any three consecutive strength tests of the laboratory-cured specimens representing each class of concrete shall be equal to or greater than the specified strength and not more than 10 percent of the strength tests shall have values less than the specified strength.

(c) Underpinning

Underpin existing members in locations shown on the drawings.. Design and provide temporary shoring and bracing to existing members, to the underpinning and to the sides of the excavations as required during the underpinning operations. Maintain the stability of the existing members to be underpinned, the underpinning, and the sides of the excavation at all times.

Conform to the sequence and method of underpinning sections as indicated on the drawings.

Protect and support existing services that may interfere with the underpinning work.

(d) Footings

1. Found footings and underpinning on naturally consolidated, undisturbed hardpan capable of safely supporting 20,000 pounds per square foot, or on rock capable of safely supporting 50,000 pounds per square foot below elevation 137'-0"

2. The soil investigation was conducted by Carr-Dee Test Boring and Construction.

6
APPLICATION
INSTALLATION
AND ERECTION
(Cont'd.)

3. If upon excavating to the specified elevations, it is found that these conditions are not fulfilled or that they are fulfilled at higher elevations, the footings shall be adjusted in size, lowered or raised accordingly but only with the written permission of the Architect. In no case shall footings be raised such that less than the minimum frost protection or minimum cap depth is provided to footings.
4. If the final footing sizes or founding elevations differ from those shown, the Contractor shall be reimbursed for the extra cost of such work or shall credit the Owner for deletions based upon the unit prices quoted for concrete, reinforcing steel and formwork. Extras or credits shall be calculated by establishing the total net extras or credit for the footings for each material and then multiplying by the appropriate unit price. Extras will be paid only if upon excavating to the specified founding elevations, it is found that conditions do not meet the requirements set forth, but for no other reason, such as the action of ground water, weather, construction traffic, etc. or the presence of nearby electrical or mechanical services (see below). Keep a record of footing founding elevations. This record must be approved by the Architect before claims for extras will be considered.
5. Location of excavations for mechanical or electrical services, pits and the like shall be approved by the Architect before excavating. Do not encroach upon a 7 in 10 slope between corners of footings at elevations shown and the bottom corner of these excavations.
6. Remove water, loose rock or foreign matter from footing excavations before placing reinforcing steel or concrete.
7. Form footing sides unless footings are shown to be poured against earth or unless the Architect permits otherwise.
8. During cold weather, prevent hardpan or rock adjacent to and beneath all footings from freezing. Do not pour footings on frozen hardpan or rock or hardpan which has been allowed to freeze and thaw.

(e) Forms

1. Architectural Concrete

- (i) Architectural concrete is concrete exposed to view in the finished building. Use necessary techniques to produce concrete of the following quality when the forms are stripped other than minor patching and clean up.

(ii) Dense, even, smooth concrete free of defects such as: honeycombing, voids, loss of fines, flow lines, cold joint lines or other similar imperfections.

(iii) Sharp, accurate definition of corners, reglets and arrises, in true alignment and in correct position, generally free of chipped or spalled areas.

(iv) Plane surfaces, without protuberances, indentations, ridges or bulges.

2. General:

(i) Design, erect, support, brace and maintain formwork to safely support vertical and lateral loads until they can be supported by the concrete structure. Construct forms so members will be of correct size, shape, alignment, elevations and position.

3. Design:

(i) Well in advance of the work submit design of forms, shores and bracing to the Architect. Design forms, shores and bracing prior to forming. Design formwork for loads and lateral pressure recommended in ACI 347, Section 102. Design considerations shall be in accordance with Section 103. Allowable stresses shall conform to the requirements of ACI 347, excepting that they may be increased 25% for temporary loading. The unsupported length of timber compression members shall not exceed 30 times their least dimensions.

4. Construction:

(i) Conform to recommendations in Chapter 2 of ACI 347 except as varied herein.

(ii) Build forms to permit adjustment of height, easy dismantling and stripping and such that removal will not damage the concrete.

(iii) Provide continuous mud sills of suitable size, bedded in sand or stone, beneath shores where they would otherwise bear on soil. Adequately prepare the soil so that settlement will not occur during or after concreting. Do not set mud sills on frozen ground.

(iv) Place shores supporting successive storeys directly above those below, or design so loads will be transmitted directly to those below.

(v) Where adequate bearings for shores cannot be secured below (such as at locations of large openings) provide a system of supports (beams or trusses) to bridge the opening.



(vi) Brace shores horizontally in two directions and diagonally in the same two vertical planes so forms can safely withstand dead and moving loads.

6
APPLICATION
INSTALLATION
AND ERECTION
(Cont'd.)

(vii) Adequately brace shores more than one tier high and brace at tier junctions.

(viii) Build top forms on sloping concrete where required to prevent flow of the concrete out of the forms. Provide vents to top forms to permit air or bleed water to escape from the forms.

(ix) Provide temporary openings at the base of columns, walls, deep beams and other forms to facilitate cleaning and inspection. Place openings so water for removing debris will run clear to outside of forms.

(x) Adequately tie side forms for walls and deep beams to prevent bulging.

(xi) Make joints of forms for architectural concrete sufficiently tight to prevent leakage of concrete fines.

(xii) Mark building, grid or other lines on forms required to permit the accurate positioning of reinforcing steel.

(xiii) Construct templates and supports as required to rigidly fix reinforcing dowels in the forms prior to concreting.

(xiv) Where necessary, provide suitable markers to indicate the location and configuration of continuing concrete members so that dowels can be positioned accurately in relation to their position in the continuing members.

(xv) Accurately set steel inserts into the forms and secure them rigidly so that they do not become displaced during concreting. Set and secure these items to the tolerances required in the appropriate divisions.

5. Release Agent and Treatment of Used Forms:

(i) Coat surface of forms to be in contact with concrete with an approved non-staining material which provides complete bond-breaking action. Apply surface treatment strictly in accordance with manufacturer's instructions. Re-coat surface of forms after use as necessary.

6. Sleeves, Chases and Formed Openings:

(i) Where pipes or services pass through walls or slabs, form the openings by an approved sleeve or form as necessary using lumber.

(ii) Form chases or recesses as shown or required.

(iii) All openings are not necessarily shown on the Structural Drawings. Refer to Architectural, Mechanical and Electrical Drawings for openings and sleeving requirements not shown, located or dimensioned on the Structural Drawings. No holes through structural members shall be formed without the Architect's approval.

6
APPLICATION
INSTALLATION
AND ERECTION
(Cont'd.)

7. Alignment of Forms During Placing:

(i) Prior to placing concrete, provide suitable means for checking the alignment and elevation of forms during placing. Make checks frequently during placement of the concrete. Carry out corrective measures, if required, both horizontally and vertically until concrete is placed.

8. Re-Use of Forms:

(i) Forms other than for architectural concrete may be re-used as long as they are satisfactory for the use intended.

(ii) Surface forms for architectural concrete shall only be re-used three times.

(iii) Lumber, once used in forms, shall have nails withdrawn and surfaces to be in contact with concrete thoroughly cleaned, repaired and re-coated with release compound if necessary before being used again.

9. Stripping of Forms:

(i) Design and provide reshores for horizontal or inclined members so they can safely support their own load plus construction loads. The reshores below a completed portion of structure, which are to support a portion of structure to be poured, shall be capable of safely supporting the dead load of the structure to be poured plus construction loads. Design and install reshores so that they are supported on members which can safely support the reshore load.

(ii) Well in advance of forms removed submit the design of the re-shoring system to the Architect.

(iii) The minimum strength of concrete in place for safe removal of soffit forms is 70% of the specified 28 day strength.

(iv) The stripped member shall be of sufficient strength to safely carry its own weight together with superimposed construction loads. As a rough guide, under specified curing conditions, 70% of the 28 day strength should be attained 7 days after concreting.

in normal weather and 14 days after concreting in "Cold Weather". In any event, do not disturb shores or forms supporting horizontal or inclined flexural members until approval to strip has been given. The Architects approval to strip forms will be based upon the results of the 7 day tests on concrete cylinders and on site curing conditions.

6
APPLICATION:
INSTALLATION
AND ERECTION
(Cont'd.)

- (v) Notify the Architect of intention to strip forms in advance of removal.
- (vi) Stripping and reshoring shall proceed simultaneously so as not to leave an area greater than 100 square feet unsupported by either formwork or reshoring at any instant. Install reshores tight to construction above and below so that they will not significantly shorten under load but take care not to preload the construction below or raise the construction above by over tightening. Locate reshores in the same position on each floor. Maintain reshoring in place for 28 days or for such longer time as may be required to ensure that the concrete has reached its designated 28 day strength. Reduce the spacing of reshores if construction loads warrant.
- (vii) As horizontal or inclined members are stripped, reshore immediately at intervals not over 10 feet in each direction over their entire area. In the case of one way slabs reshore along the midspan at intervals not over 10 feet. In the case of one way slabs with spans less than 10 feet provide at least one line of reshores along the midspan.
- (viii) Side forms for vertical members (columns and walls) may be stripped as soon as the concrete is sufficiently strong to stand unsupported, but not before 4 days after concreting.
- (ix) Do not strip within one and a half bays of a construction joint until new concrete beyond the construction joint has reached 70% of its specified 28 day strength.
- (x) Do not strip soffit forms for bridge deck until the post-tensioning and grouting of ducts has been satisfactorily completed.

(f) Reinforcing Steel

1. Fabrication

- (i) Fabricate reinforcement to the dimensions shown and within the tolerances stated in ACI 315.

(ii) Fabricate reinforcement at the mill or at a fabricator's shop approved by the Architect.

(iii) Tag each bar with code mark corresponding to that appearing on bar list.

(iv) Bend reinforcement once only and at room temperature. Do not straighten or rebend reinforcement. Heating of reinforcement will be permitted only with the approval of the Architect. Do not use bars with kinks or bends not shown on the drawings.

6
APPLICATION
INSTALLATION
AND ERECTION
(Cont'd.)

2. Cleaning:

(i) Prior to placement and prior to depositing concrete clean reinforcement of loose, flaky rust, mud, concrete, oil or other coatings which would destroy or reduce bond.

(ii) If there is a delay in depositing concrete, reinspect reinforcement and clean as necessary just before resumption of concrete placing.

3. Placing:

(i) Place reinforcement, support and secure against displacement, in accordance with the recommendations contained in CRSI Manual for Placing Reinforcing Bars and to the tolerances recommended in that manual.

(ii) Support reinforcement in footings, slabs on grade, walks, pavements, or concrete toppings, on precast concrete blocks or other approved devices of a number and thickness to maintain reinforcement in correct position. Where toppings are placed on waterproof membranes, vapour barriers, and the like, prevent reinforcement or tie wire contacting these items.

(iii) In members exposed to weather, secure reinforcement so that no metal comes closer than $1\frac{1}{2}$ inches from a formed surface and 2 inches from a trowelled surface.

(iv) Place reinforcement accurately and secure against displacement by using annealed iron wire ties or clips approved by the Architect at intersections. Tack welding of reinforcement to secure in place will not be permitted.

(v) Secure reinforcement in walls using sufficient spaces to maintain the requisite distance between reinforcement and wall face . . . so that vertical bars are plumb. Provide a minimum of #3 spreader bars spaced at 6'-0" centres in both directions.

- (vi) Support reinforcement in beams and suspended slabs using beam chairs; continuous chairs or slab bolsters.
- (vii) Set column and wall dowels prior to concreting with wooden templates, or other approved means.
- (viii) Do not drive reinforcement into concrete.
- (ix) No bars partially embedded in concrete shall be field bent.
- (x) Preassemble column and beam cages as necessary. Do not "spring" or bend ties and stirrups in order to place longitudinal reinforcement.

6
APPLICATION
INSTALLATION
AND ERECTION
(Cont'd.)

4. Welded Wire Fabric:

- (i) Supply welded wire fabric in flat sheets.
- (ii) Lap ends and sides of fabric in accordance with the recommendations of CRSI but in any event not less than 6".
- (iii) Where reinforcement is not shown in slabs on grade, walks, toppings over waterproof membranes, or toppings 2½" in thickness or greater provide 6x6 6/6 welded wire fabric at mid-depth.

(g) Construction Joints:

1. The location and details of construction joints not shown shall be subject to the approval of the Architect. Provide construction joints at locations shown unless permission to delete the joint is given by Architect.
2. Continue reinforcement through the joint in its normal position. Add additional reinforcement across the joint as shown or directed.
3. Use vertical construction joints in slabs, beams or continuous footings unless noted otherwise. Locate construction joints at midspan between points of support in slabs, beams or similar members.
4. Provide horizontal construction joints in walls or columns only at the underside of beams or slabs unless noted otherwise.
5. Wherever shown or directed provide a key in construction joints.
6. Where it is desired to make a construction joint not shown at a section where there is significant shear, provide inclined reinforcement through the joint, to the approval of the Architect.

7. Install continuous steel waterstops in locations shown fixed rigidly in forms prior to concreting. Splice waterstops using suitable laps and welding in a manner that the waterstopping action will not be interrupted.
8. Provide reglets in joints as shown.
9. Before depositing new concrete on set concrete re-tighten forms, clean the surface of the set concrete, reinforcing steel and forms of foreign matter, adhering concrete or laitance and saturate these items with water.
10. Remove laitance and concrete fines from the surface of horizontal construction joints to expose the coarse aggregate.

(h) Control Joints:

1. Construct control joints at the exact locations and in accordance with the details shown.
2. Where specific locations of control joints are not shown, locate as the Architect directs.
3. Mark the location of control joints on the first form face erected to assist in accurately positioning the break in horizontal reinforcement.

(i) Placing of Concrete:

1. Conveying:

- (i) Flush equipment for conveying concrete with clean water before and after each pour.
- (ii) Convey concrete from the truck to the place of final deposit by methods which will prevent segregation and a marked change in consistency.
- (iii) Convey concrete using suitable equipment to ensure continuous placing of concrete.

2. Depositing:

- (i) Arrange the sequence of placing concrete to prevent damage to partially hardened concrete due to injurious vibration or shock.
- (ii) Immediately before placing concrete clean forms and reinforcement of foreign matter.
- (iii) Deposit concrete in forms as rapidly as possible, and as nearly as practicable to its final position in approximately horizontal layers. Avoid segregation due

to rehandling or flowing. Do not use concrete mixed more than 1 hour after introduction of mixing water during hot weather conditions or 1½ hours during other periods, or concrete contaminated by foreign materials.

6
APPLICATION:
INSTALLATION
AND ERECTION
(Cont'd.)

- (iv) Place concrete in a continuous operation until an entire section is completed. Do not permit cold joints to develop.
- (v) The maximum free drop shall not be greater than 4 feet. Where the free drop is greater than the above, employ suitable plastic "elephant trunks" to reduce the free drop to the above distances.
- (vi) Allow 24 hours minimum after depositing concrete in columns, piers or walls before depositing concrete in beams or slabs supported thereon.
- (vii) In upstand beams, and similar details where concrete has to be placed in two or more stages and where the monolithic nature must be maintained, cast the upper portion as soon as the stiffening of concrete in the lower portion will permit. Minimize the accumulation of free water or laitance at the level of the joint by using concrete in the lower portion having a stiffer consistency than normal. Remove free water before the next layers of concrete are placed.
- (viii) Remove concrete spilled onto forms around hoisting equipment before depositing concrete in these areas.
- (ix) Protect membranes during placing of concrete over waterproof membranes.

(j) Compacting:

1. Thoroughly compact concrete during and after depositing by spading and vibration to work the concrete around reinforcement and inserts so that the finished concrete is dense, uniform and free of air holes or honeycombs. No segregation of the cement paste and aggregate shall occur.
2. Use internal mechanical vibrators operating at a frequency of 8,000 impulses per minute minimum, fully immersed, to compact concrete. External vibrators may be used where adequate compaction is not possible using internal vibrators alone. The type, number and method of use of vibrators shall be to the approval of the Architect. Maintain vibrators in good operating order.
3. Apply the vibrator systematically and at such intervals that zones of influence of the vibrator overlap. Apply

the vibrator at any point until the concrete is properly compacted, but not for such time that segregation will occur. Do not impel the concrete horizontally into place by means of vibration.

6
APPLICATION
INSTALLATION
AND ERECTION
(Cont'd.)

4. Internal vibrators shall not disturb the reinforcing steel forms or other built-in items.
5. In deep members such as walls, columns or beams, extend vibrators through a particular pour layer being compacted to at least 6 inches into the lower layer.
6. Reference is made to ACI Report Number 56-49, Consolidation of Concrete. The recommendations contained therein shall be considered as acceptable standards for compacting concrete.

(k) Floor Finishing:

1. General

- (i) The top or final surface of concrete shall be finished by one or more of the operations of screeding, floating or trowelling.
- (ii) Screeding consists of moving a straight edge or template with a sawing motion along wood or metal strips accurately established on rigid supports at the specified elevations by transit level: Screed immediately after consolidation of the concrete to give the surface its approximate shape and elevation. Roughen concrete surfaces that are noted to receive a concrete topping by raking or wire brooming before the concrete has fully hardened so that the topping will be completely bonded.
- (iii) Floating consists of accurately finishing the concrete surface with a wood float to the elevation or profile shown. Floating follows the screeding after sufficient stiffening of the concrete surface has occurred.
- (iv) Trowelling consists of finishing the concrete surface with a finishing machine and hand finishing with a steel trowel (care being taken not to over-trowel) to the elevation or profile shown. Bring the finish to a dense, smooth, level surface free from defects, ridges, voids or machine marks, trowelling being continued until the required finish is obtained. Floors shall finish flush with adjacent finished floor panels. When trowelling floor surfaces maintain the air temperature at a minimum of 50°F.
- (v) Grinding: Where in the opinion of the Architect the steel trowel finish is not of the quality specified, remove ridges, undulations, projections at construction joints and areas of carbonation and scaling by grinding

and/or properly filling, as directed by the Architect.

- (vi) Do not use dry cement or cement and sand to blot up excess water.

6
APPLICATION
INSTALLATION
AND ERECTION
(Cont'd.)

2. Location of Finishes:

Finish concrete slabs in accordance with the following table of requirements:

<u>Location</u>	<u>Room Finish Schedule Designation</u>	<u>Type of Finish</u>
Interior Floor Slabs	Resilient Floor Tile	
	Duronite	Steel
	Concrete with Linseed Oil	trowel
	Wood Parquet	
	Quarry Tile	Wood
	Ceramic Mosaic Tile	Float
Exterior Paving	Asphalt Block Paving	Rough Screed

3. Toppings:

- (i) Aggregates for concrete toppings shall meet the requirements for aggregate set forth. The maximum size of aggregate shall be 1/2 inch.
- (ii) Concrete for topping shall have an ultimate 28 day strength of at least 3,000 p.s.i., and the slump shall not exceed 2 inches.
- (iii) Apply toppings as follows:

Thoroughly clean base slab and remove loose particles with an industrial vacuum.

After cleaning, maintain base slab moist for 24 hours minimum prior to placing topping.

Set rigid screeds accurately by transit level to provide level or sloped floors as required. "Wet" screed methods will not be permitted.

Bring base slabs to same temperature as surrounding atmosphere before placing topping. Minimum temperature shall be 50°F.

Apply a slurry coat to slab before placing topping. The slurry shall consist of cement and water mixed to a thick paste. It shall be thoroughly broomed into the slab surface. Place topping while slurry is still tacky.

Thoroughly consolidate and finish toppings as specified.

6

APPLICATION
INSTALLATION
AND ERECTION
(Cont'd.)

Apply toppings over waterproofing membranes, as specified above excepting as follows:

Ensure that the top of the waterproofing is thoroughly cleaned before the topping is applied and ensure that the membrane is not damaged due to any concreting operation.

4. Sealing:

- (i) Seal as called for on the drawings concrete subject to the action of salt used for snow removal with boiled linseed oil conforming to ASTM D250 cut back with kerosene to form a 50-50 mixture.
- (ii) Do not apply sealant until the concrete has cured a minimum of 2 weeks. Maintain surfaces clean and dry, with the ambient air temperature no lower than 45°F at time of application.
- (iii) Apply mixture in 2 coats by suitable means to achieve uniform coverage. Apply each coat at the rate of 50 square yards per gallon of sealant. Allow first coat to dry before applying second coat. Do not contaminate adjacent asphalt pavements.
- (iv) When the second coat of sealer is dry the surfaces may be subjected to traffic. Where residual slipperiness exists, lightly blind the surface with fine sand.
- (v) Take precautions to prevent fires.

5. Cure and seal floor slabs which have no applied finishes (such as vinyl tile and the like) with a compound equal to Tremcrete, as manufactured by the Tremco Manufacturing Company. Apply in strict accordance with the manufacturer's directions.

(1) Curing:

- 1. After concrete has set, keep exposed surfaces continuously moist for 7 days after depositing by methods approved by the Architect.
- 2. A curing compound, conforming to ASTM C309, may be substituted with the approval of the Architect. The curing compound shall not deleteriously affect the bond of the following finishes. If vertical members are stripped before 7 days after pouring, cure by applying a curing compound.

(m) Tolerances:

1. Perform forming operations so that completed work will be within tolerance limits set out in ACI 347 clause 203.1

(n) Treatment of Formed Surfaces:

1. General

- (i) The bared surface of concrete shall be inspected by the Architect. Do not proceed with repairs or surface treatment to concrete prior to the Architect's inspection.

2. Unexposed Surfaces:

- (i) After the Architect's inspection, remove or cut back 1" bolts, ties, nails, or other metal not specifically required for construction purposes.
- (ii) Where no serious defects are revealed by the Architect's inspection, cut out areas of moderate honeycombing to sound concrete. Saturate with water and fill with cement mortar of the same general composition as that used in the concrete.
- (iii) Where serious defects are found, such as large voids or extensive honeycombing, repair the defect as directed by the Architect.
- (iv) Where surfaces are to be plastered or similarly finished, remove fins, ridges or bulges, which would interfere with the application of the plaster or finish.

3. Architectural Concrete Surfaces:

- (i) Go over the surface, remove ties, timber, inserts, minor imperfections, leaving the surface clean.
- (ii) Patching will only be permitted where it is required to an insignificant extent. If the Architect permits patching, demonstrate to the Architects satisfaction that the patch will accurately match the colour and texture of the surrounding concrete and will be properly bonded thereto.
- (iii) Fill tie rod holes with an approved non shrink mortar.

4. Sand Blasting:

- (i) Sandblast the exposed surfaces of concrete members as required to a depth sufficient to remove the surface skin and to just expose the coarse aggregate.

6
APPLICATION
INSTALLATION
AND ERECTION
(Cont'd.)

(ii) Individual concrete members shall be sandblasted at the same age to ensure reasonable colour uniformity. Protect adjacent surfaces not noted to be sandblasted.

(iii) Do not proceed with sandblasting operations until the Architect has inspected and approved the surface to be sandblasted.

(o) Openings Through Completed Members:

1. Do not provide openings or sleeves through completed members without the Architect's approval.
2. Where the location of openings or sleeves is approved, mark their position on each side of members to be perforated. In the case of slabs over 3 inches thick, cut two-thirds of the thickness by drilling from the top and remaining one-third by cutting from the bottom. Drill walls similarly from each side.
3. Advise the Architect should reinforcing steel be encountered in drilling. Relocate boring positions as the Architect may direct.
4. Maintain the axis of the hole at right angles to the surface of the member unless otherwise directed by the Architect.

(p) Slabs on Grade:

1. Do not place concrete slabs on grade until the specified sub-floor material has been placed, inspected and approved. Do not place concrete on a frozen sub-grade, on one that has been frozen and thawed, or on one that contains frozen materials. If the sub-grade becomes frozen, remove affected material and replace with compacted granular fill.
2. Maintain the sub-grade for a depth of 6 inches minimum below the sub-floor material at a temperature of 65 °F. minimum, when concrete is poured thereon. Ensure that the sub-grade below slabs on grade already constructed does not become frozen.
3. Place a 5 inch depth of 5/8 inch maximum size crushed stone and 1 inch depth of 1/2 inch crushed stone over the sub-base and thoroughly roll and consolidate to the lines and levels required.
4. Upon approval of the placement of the sub-floor material, place reinforcing as shown. Place and consolidate concrete and finish and cure as specified hereinbefore.

5. Joints in Slabs on Grade:

(i) Where slabs abut adjacent construction provide a layer of building paper between.

(ii) Saw-cuts in slabs. Saw-cut all slabs on grade into panels not exceeding 400 square feet with a maximum length between saw-cuts of 25 feet. In areas where the length of the slab on grade is interrupted by bearing walls at distances not exceeding 25 feet apart in a particular direction, saw-cuts may be omitted in that direction. Arrange panels as shown or to Architect's approval. The width of the saw-cut shall be 3/16 inch and shall have a depth of one-quarter the slab thickness. Saw-cut as soon as it is practicable to work on the slab without tearing out the coarse aggregate.

(iii) After a period of at least 28 days fill saw-cuts with mortar containing cement, sand and an approved type of latex bonding agent. The joints to be filled shall be clean dry and free of foreign matter.

(iv) Construction joints - Construction joints may be provided in slabs on grade so that pours on any one day may be kept to reasonable sizes. Locate construction joints to the Architect's approval. Use techniques to finish abutting pours at joints to eliminate "humping". If humping occurs, grind the joint down level to the surrounding surface. Provide a reglet at joints of the approximate width of a saw-cut and fill the reglet as specified for saw-cuts.

(q) Reinforced Block Lintels:

1. Supply and place concrete and reinforcing steel for reinforced block lintels in accordance with the requirements of Typical Detail Sheet No. 14 and this specification.

2. Accurately place and secure reinforcement in the cavity prior to concreting. Trowel top of lintel as required to permit laying of succeeding block course.

(r) Typical Detail Sheets:

Conform to the requirements of typical detail sheets numbers 1,2,5,6,7,8,9,10,14,15,16 and 17 contained herein which supplement the drawings. Where information on the typical details is at variance with the drawings or the remainder of the specification, the typical details do not govern.

6
APPLICATION
INSTALLATION
AND ERECTION
(Cont'd.)

(s) Making Good:

Make good openings left in concrete construction around pipes, ducts, and the like using a mortar of the same proportions as the surrounding work and reinforcing same with mesh, if considered necessary by the Architect.

6
APPLICATION/
INSTALLATION
AND ERECTION
(Cont'd.)

(t) Defective Material and Workmanship:

1. Materials or workmanship which fail to meet specified requirements may be rejected by the Architect whenever found at any time prior to final acceptance of the work regardless of previous inspection. If rejected, defective materials or work incorporating defective materials or workmanship shall be removed and replaced or repaired to the satisfaction of the Architect, without unnecessary delay, at no expense to the Owner.
2. Where the Architect's inspection reveals materials or workmanship below specified quality, he shall have the right to have tests performed or surveys made such as tests on reinforcement, concrete core strength tests, analytical calculation of structural strength or load testing of the structural elements in question, in order to help determine whether the work need be replaced. All such testing or survey work will be made at the Contractor's expense regardless of their results, which may be such, in the Architect's opinion, that will permit leaving the work in place.
3. All testing shall be conducted in accordance with the requirements of ACI 318, except where this would in the Architect's opinion cause undue delay or give results not representative of the rejected material in place. In this case, the tests shall be conducted in accordance with the standards given by the Architect.

(a) Concrete: ready-mix, controlled concrete throughout. Conform to ACI 318 for methods of measuring materials batching, mixing and delivery.

7
MATERIALS

(b) Cement: normal Portland cement conforming at the time of its incorporation in the mixture to ASTM C150.

(c) Coarse aggregate: crushed rock or gravel or a combination thereof, conforming to ASTM C33. The nominal size of the coarse aggregate shall be as follows:

<u>Portion of Structure</u>	<u>Nominal Size</u>
toppings	1/2 inch to No. 4
remainder.	3/4 inch to No. 4

- (d) Fine aggregate: natural sand or other inert materials with similar characteristics or a combination thereof conforming to CSA A23.
- (e) Admixtures: air entraining agents conforming to the requirements of ASTM C260 and water reducing admixtures conforming to the requirements of ASTM C494.
- (f) Grout: an approved non-shrink grout having a minimum compressive strength of 5000 p.s.i. at 28 days. Where grout is exposed to view or to weather, use non-ferrous expansion agents.
- (g) Reinforcement: intermediate grade steel conforming to ASTM A15, and deformed billet steel bars conforming to ASTM A432 and to the material specifications shown on the drawings.
- (h) Welded wire Fabric: conform to ASTM A185.
- (i) Support Accessories: metal chairs bolsters or spacers of sufficient strength to rigidly support the weight of reinforcement and construction loads, except in the case of concrete exposed to weather the accessories shall be such that no metal is permitted to come closer than 1½ inches from a formed face and 2 inches from a travelled surface.
- (j) Formwork: conform to recommendations of ACI 347 in general and ACI 347 section 401 for formwork for exposed concrete.
- (k) Form ties for Architectural Concrete: threaded, internal disconnecting type, designed to act as spreaders and, when the external portion of the tie is removed, no metal is left closer than 1 inch to the surface.
- (l) Metal Waterstops: unprimed mild steel.

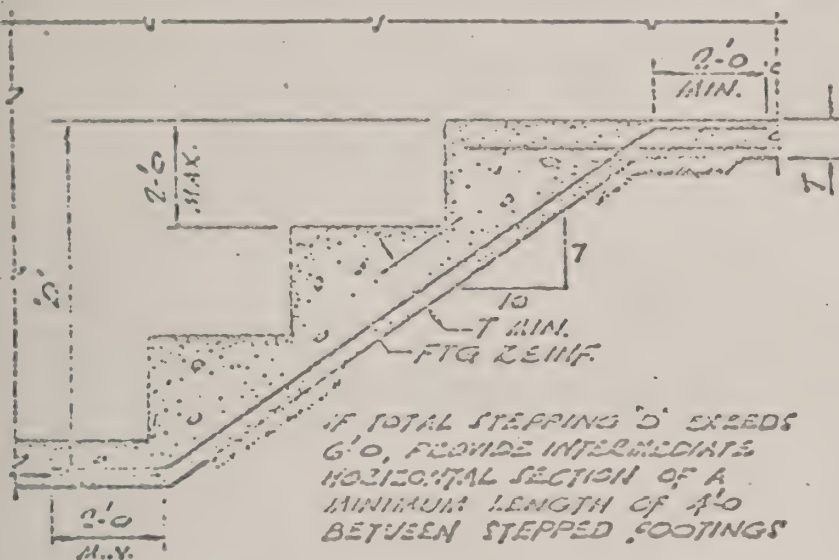


TYPICAL DETAIL

M.S. YOLLES ASSOCIATES LIMITED

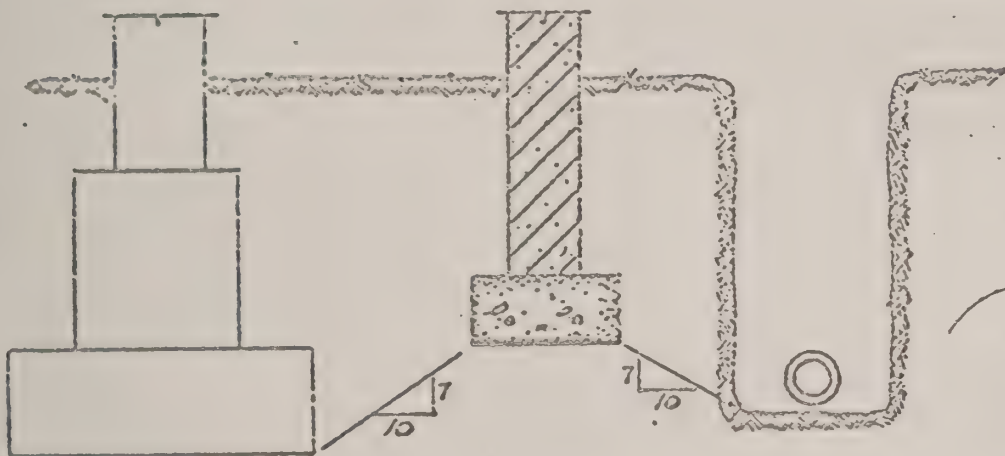
FOOTINGS

11

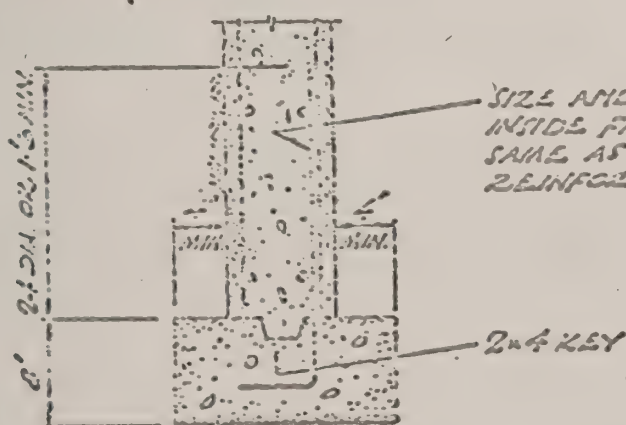


TYPICAL STEPPING DETAIL

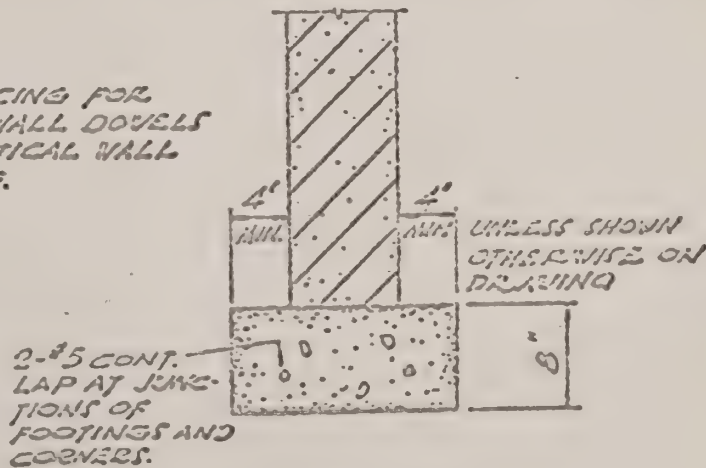
MARKED S.D.F. ON PLAN
(STEPPED DOWN FOOTING)



ELEVATION OF ADJACENT FOOTINGS AND EXCAVATIONS



CONCRETE



CONC. BLOCK

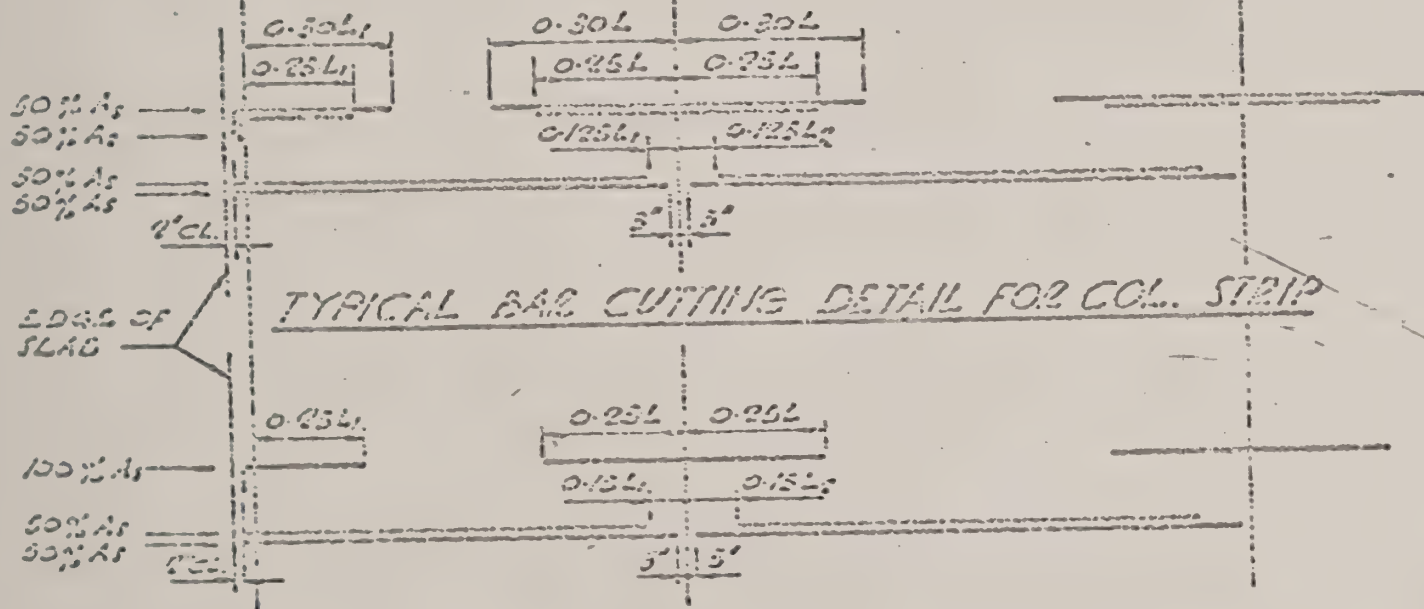
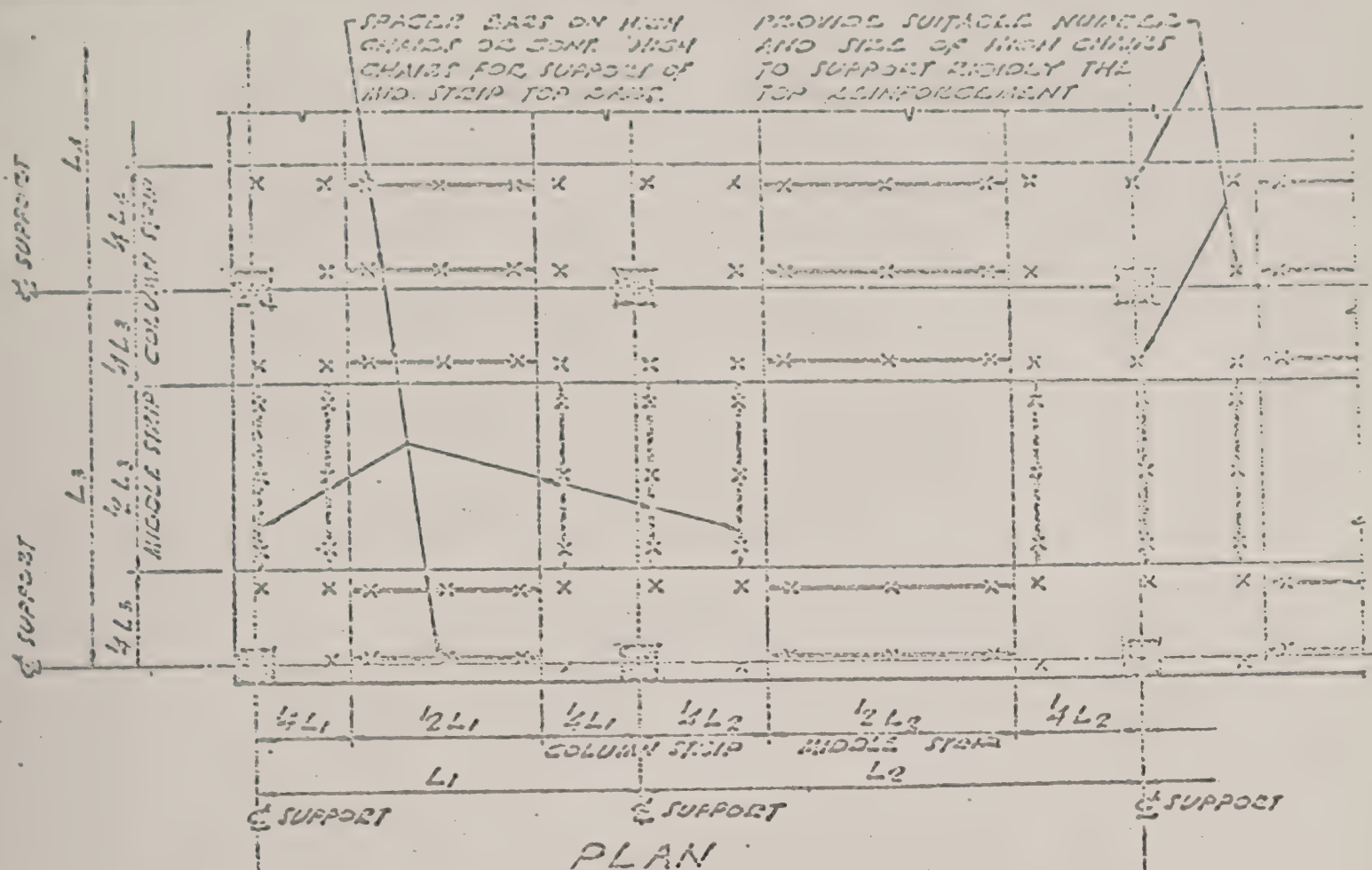
WALL FOOTING DETAILS



TYPICAL DETAIL

M. S. YOLLES ASSOCIATES LIMITED

FLAT SLAB WITHOUT DROPS - STRAIGHT BARS



TYPICAL BAR CUTTING DETAIL FOR MIDDLE STRIP

NOTES:

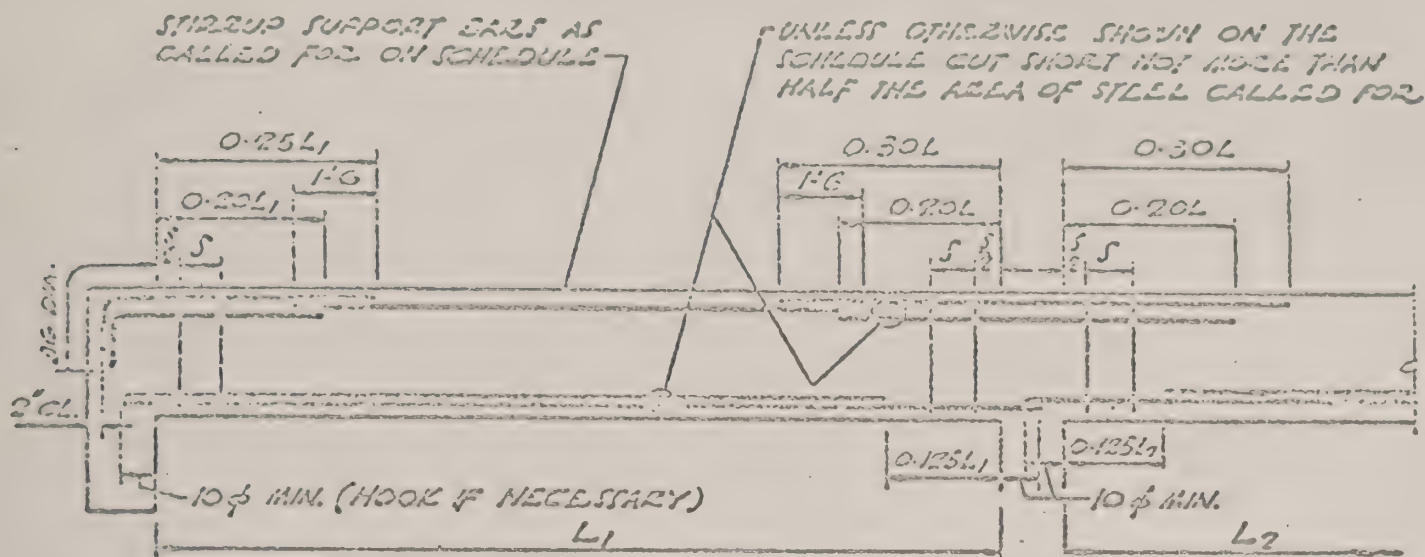
1. L IS LONGER OF L_1 & L_2 OR L_3 & L_4
2. FOR PLACING ORDER OF BARS SEE FRAMING PLANS.
3. A_s DENOTES AREA OF STEEL



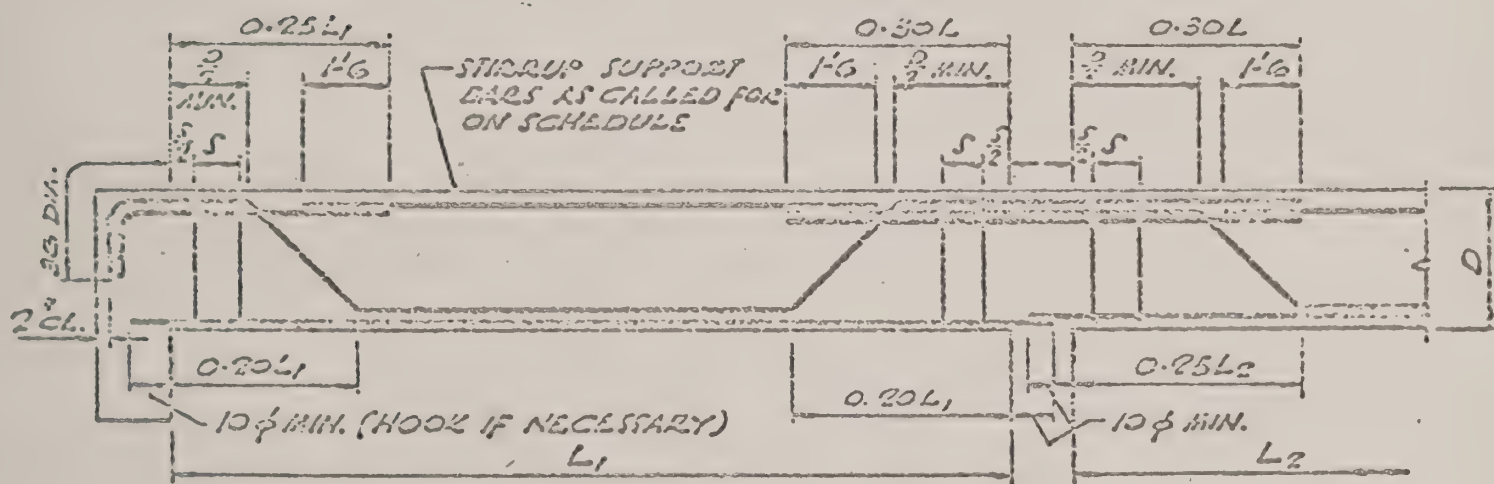
TYPICAL DETAIL

M.S. YOLLES ASSOCIATES LIMITED

BAR CUTTING AND BENDING FOR BEAMS AND JOISTS



FOR JOISTS & BEAMS WITH STRAIGHT BARS
UNLESS OTHERWISE NOTED ON PLANS OR IN SCHEDULE



FOR JOISTS & BEAMS WITH BENT UP BARS
UNLESS OTHERWISE NOTED ON PLANS OR IN SCHEDULE

NOTES:

1. L IS LONGER OF L₁ OR L₂
2. L₂ OR L₁ = CLEAR SPAN
3. S = SPACING OF STIRRUPS
4. WHERE THE LARGER SPAN DOES EXCEED THE SHORTER BY MORE THAN 20% USE THE BAR CUTTING LENGTHS SHOWN IN THE SCHEDULE ON STRUCTURAL DRAWINGS.



M. S. YOLLES ASSOCIATES LIMITED

DOVELS SAME SIZE AND NUMBER AS EACH COLUMN BARK SHEET IF TWO OTHERWISE BY COLUMN FORMULE. PLACE THESE DOLS IN SAME LAYER AS BARK OR SLAB STILL IN CORRESPONDING DIRECTION. NOT REQUIRED WHEN COLUMN VERTICALS CAN PROJECT AT LEAST A DISTANCE INTO FLARE OR BARK.

-SEE NOTE #1
BELOW

- CONSTRUCTION
JOINT

- PROJECT OVERLAPPING EQUAL IN AREA TO VERTICAL COLUMN STEEL AREA. UNLESS NOTED OTHERWISE, AREA OF VERTICAL REINFORCEMENT IN EXCESS OF THIS, USED ONLY PROJECT A DISTANCE d_c (FORM) FROM BOTTOM OF FLANGE, SLAB OR SHALLOWEST BEAM.

3 MAX. FOR
CORNERED SPLICE

SEE NOTE #1
BELOW

-DOWNS TO MATCH
CUT OFF COUNCIL
VOTERS ONLY

మొదటి పాఠశాల
వెనుకవైపు

FIN. FLOOZ

BOTTOM OF PLATE,
SIDE ON CASE —

ONE SET OF TIES—
REQ'D WHEN "X"
DIMENSION EXCEEDS
4 THE SPACING

ADD ONE
SET OF TIES

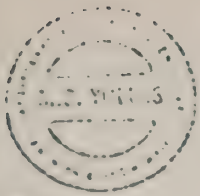
TYPE SLOPE

1. DOUBLE LENGTH OF FORD DEFORMED BARS WHEN
PLACED 1000 PSI SHALL BE:

NO	ORG	ORIGINATOR	WHERE	YIELD	STRENGTH	R	DOSE PER
20	—	—	—	—	—	—	50,000 PSI
21	—	—	—	—	—	—	25,000 PSI
22	—	—	—	—	—	—	75,000 PSI

5. VERTICAL COLUMN MUST BE SENT IN THE FIELD OR AFTER
CAST INTO COLUMN.

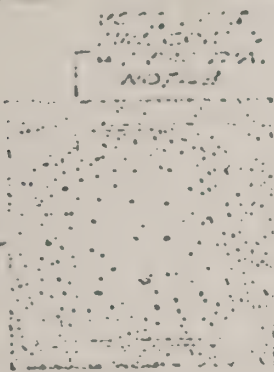
2. FOR THE ARRANGEMENTS SEE TYPICAL DETAIL SHEET NO. 22 IS OTHERWISE NOTED ON STRUCTURAL DRAWINGS



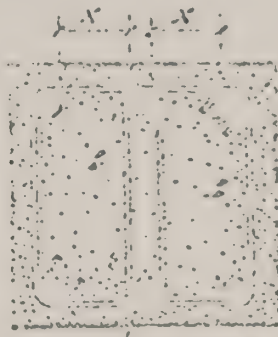
TYPICAL DETAIL

H.S. YOUNG ASSOCIATES LIMITED

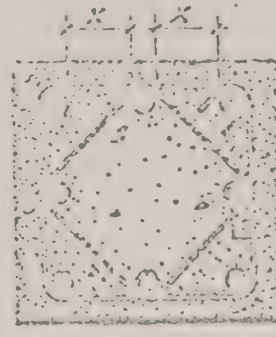
ARRANGEMENT OF TIES IN COLUMNS



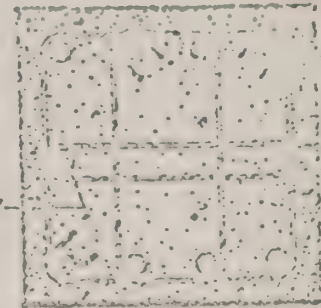
4-BARS



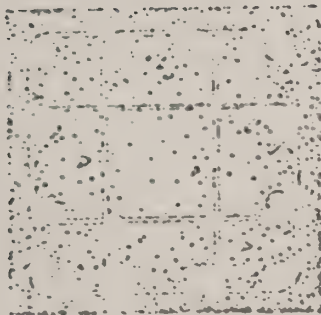
6-BARS



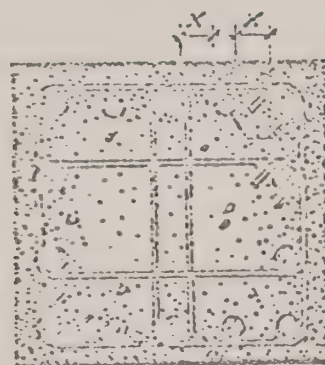
8-BARS



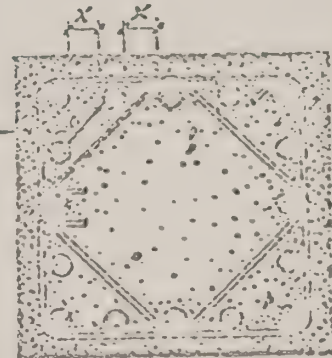
10-BARS



12-BARS



14-BARS

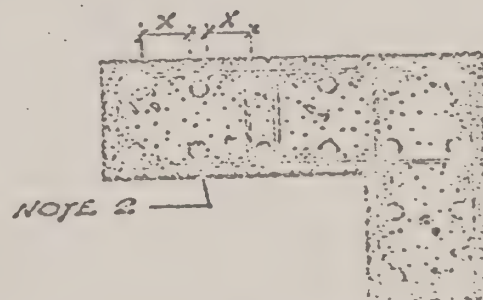


16-BARS



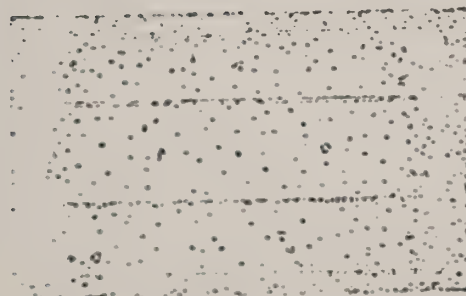
NOTE 2

WALL LIKE COLUMN



NOTE 2

TYPICAL ARRANGEMENT OF CORNER COLUMNS

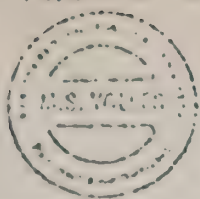


NOTE 2

COLUMN MUST BE TIED FOR UNIFORM LOAD

NOTES:

1. THESE BARS MUST BE TIED AS SHOWN BY DASHED LINES WHEN X DISTANCE IS OVER 6".
2. THESE BARS NEED NOT BE TIED WHEN X DISTANCE EQUALS 6" OR LESS.
3. APPLICABLE TO ALL TIED COLUMNS.

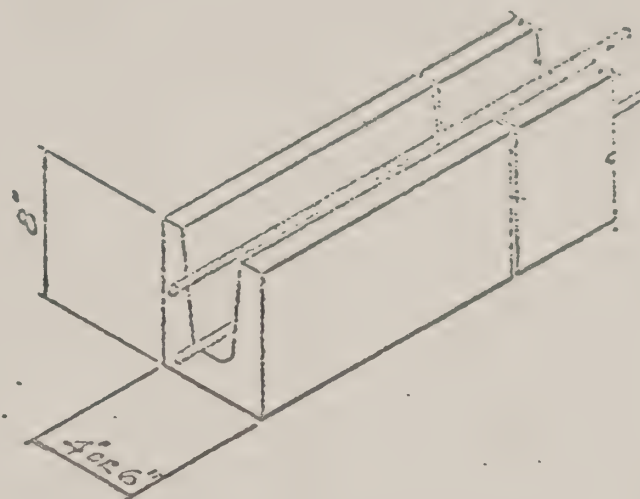
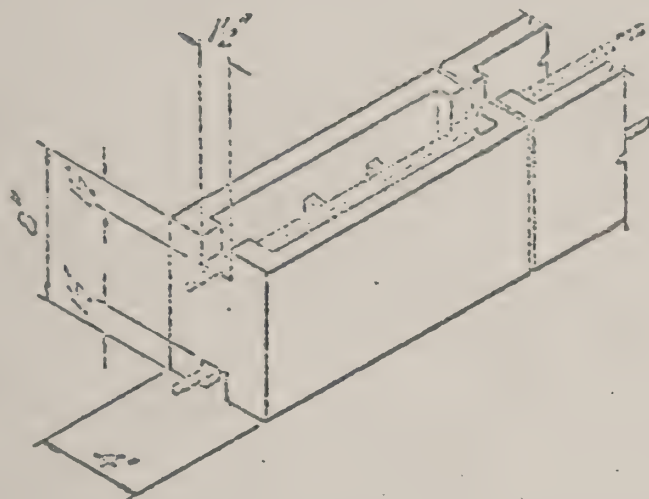


TYPICAL DETAIL

M. S. VOLLES ASSOCIATES LIMITED

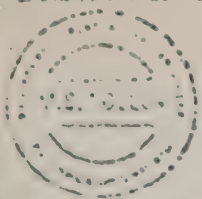
LINTELS 2

FOR 4" AND 6" NON-LOAD BEARING PARTITIONS



NOTES:

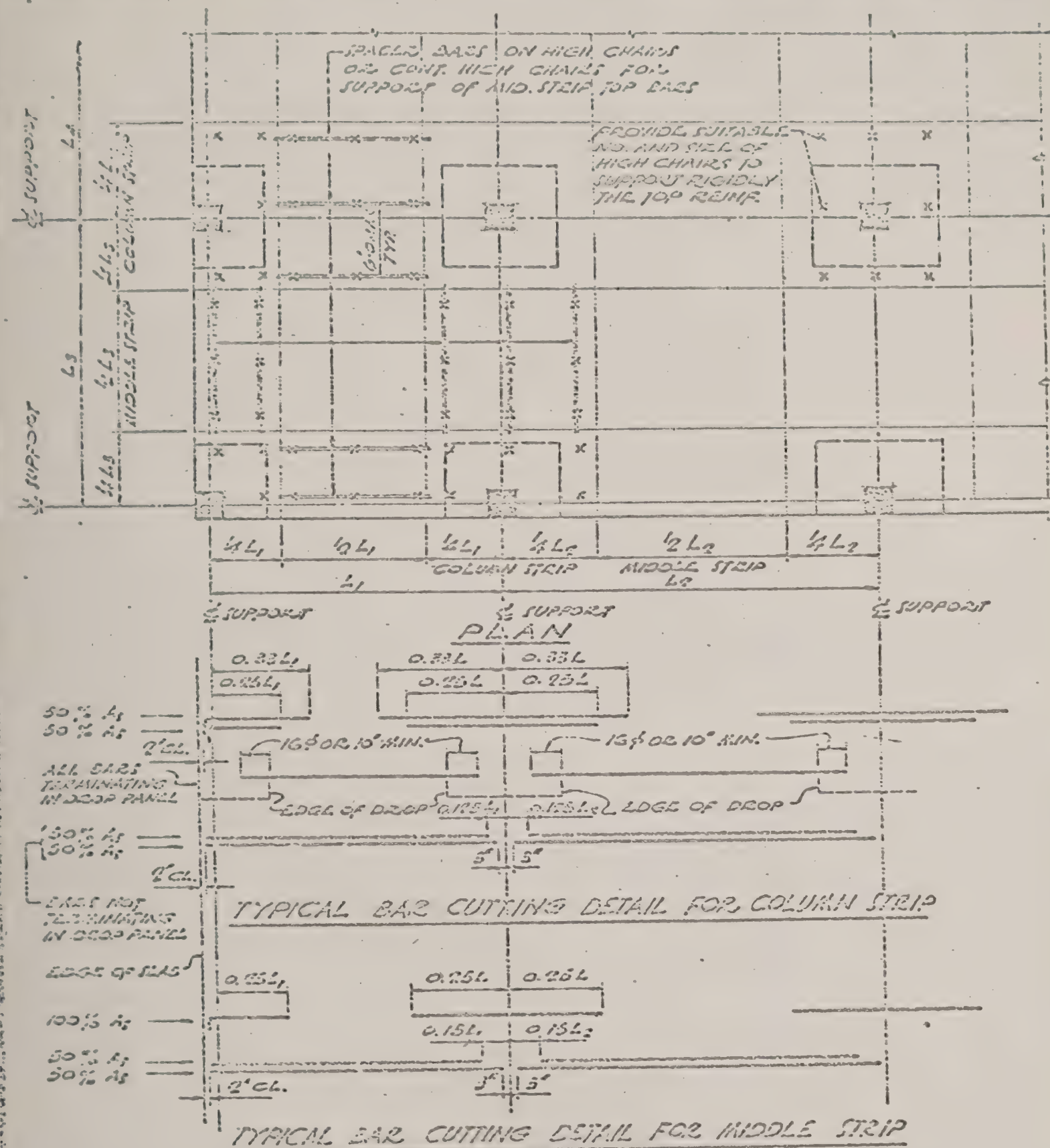
1. FOR LINTELS IN NON BEARING PARTITION WALLS UP TO 4'-0" IN CLEAR SPAN PROVIDE 1-#3 HOOKED TOP AND BOTTOM FOR 4" THICK PARTITIONS AND 2-#3 HOOKED TOP AND BOTTOM FOR 6" PARTITIONS.
2. FOR CLEAR SPANS UP TO 6'-0" PROVIDE 1-#4 FOR 4" PARTITIONS AND 2-#4 FOR 6" PARTITIONS AS CALLED FOR IN NOTE #1.
3. PROVIDE A MINIMUM LENGTH OF BEARING OF 8".
4. PROVIDE CONCRETE FILL IN VOIDS OF BLOCKS, WHICH SHALL HAVE A 3000 PSI. ULTIMATE COMPRESSIVE STRENGTH AT 28 DAYS.
5. WHERE LINTELS MEET REINFORCED CONCRETE COLUMNS, REINFORCED CONCRETE WALLS OR STEEL COLUMNS, PROVIDE 3"x3'x1/2" SHELF ANGLE. FOR ANCHORAGE USE WELDING OR 2-#4 INSET ANCHORS, EXCEPT AS OTHERWISE SPECIFIED ON DRAWINGS.



TYPICAL DETAIL

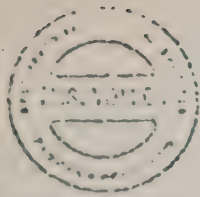
H.S. YOLLES ASSOCIATES LIMITED

FLAT SLAB WITH DROPS - STRAIGHT BARS



NOTES:

1. L IS LONGER OF L_1 OR L_2 AND L_3 OR L_4 .
2. A_s DENOTES AREA OF STEEL.
3. FOR PLACING ORDER OF BARS SEE FRAMING PLANS.

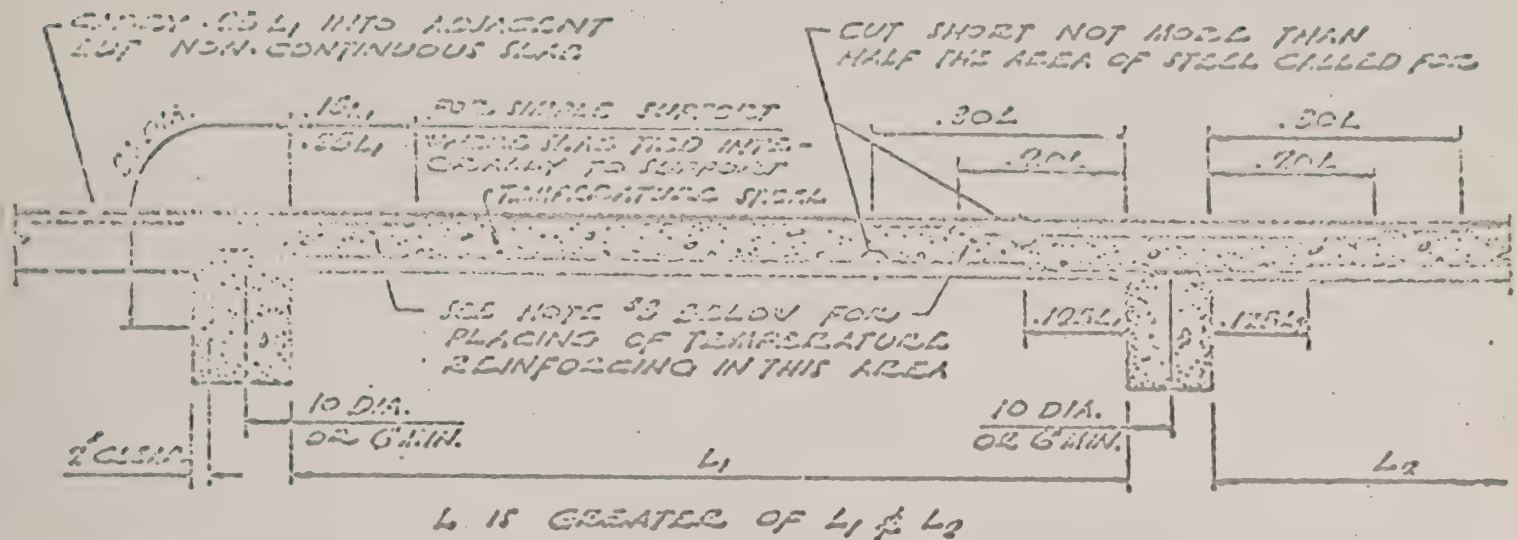


TYPICAL DETAIL

M. S. YOLLES ASSOCIATES LIMITED

ONE-WAY SLAB

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NOTES:

1. TOP BARS SHALL BE CARRIED INTO THE SUPPORT 24 DIAMETERS AS SHOWN (OR HOOKED AS SHOWN DOTTED)

TEMPERATURE REINFORCEMENT

1. PROVIDE THE FOLLOWING TEMPERATURE REINFORCEMENT FOR ALL ONE WAY SLABS.
2. MIN REINFORCEMENT 24 DIAMETERS, BUT NOT LESS THAN 12#.
3. WHERE SLAB REINFORCING CONSISTS OF TOP & BOTTOM BARS, PLACE TEMPERATURE REINFORCING TOP & BOTTOM ALTERNATELY.

SLAB THICKNESS	DEFORMED BARS			
	INTERMEDIATE OR HATCHED SLABS - $f_y = 60,000$ P.S.I.		A432 - $f_y = 60,000$ P.S.I.	
	INTERMEDIATE SLABS $f_y = 60,000$ P.S.I.	EXPOSED SLABS $f_y = 60,000$ P.S.I.	INTERMEDIATE SLABS $f_y = 60,000$ P.S.I.	EXPOSED SLABS $f_y = 60,000$ P.S.I.
	AS SPECIFIED	ON DRAWINGS	AS SPECIFIED	ON DRAWINGS
3"	#3 @ 15	#3 @ 15	#3 @ 15	#3 @ 15
3 1/2"	@ 16	@ 15	@ 16	@ 16
4"	@ 16	@ 14	@ 15	@ 15
4 1/2"	@ 15	#4 @ 17	@ 15	@ 14
5"	@ 14	@ 16	@ 14	#4 @ 17
5 1/2"	#2 @ 18	@ 15	@ 14	@ 15
6"	@ 16	@ 15	#4 @ 16	@ 15
6 1/2"	@ 15	@ 15	@ 17	@ 15
7"	@ 15	#5 @ 15	@ 16	@ 15
7 1/2"	@ 15	@ 16	@ 15	@ 15
8"	@ 15	@ 15	@ 15	#5 @ 17
	#5 @ 15	@ 15	@ 15	@ 15
	@ 17	@ 15	@ 15	@ 15
	@ 15	@ 15	#5 @ 15	@ 15
10"	@ 15	#6 @ 15	@ 17	@ 15
11"	@ 15	@ 17	@ 16	#6 @ 15
12"	@ 15	@ 16	@ 15	@ 17
13"	@ 15	@ 15	@ 15	@ 17
14"	#5 @ 15	@ 15	@ 15	@ 15



TYPICAL DETAIL

H.S. YOLLES ASSOCIATES LIMITED

ABBREVIATIONS

A-BOLT	= ANCHOR BOLT	IN.	= INCH, INCHES
AFB	= ASPHALT IMPREGNATED FIBREBOARD	INT.	= INTERIOR
AF	= ASBESTOS FIREPROOFING		
ARCHT.	= ARCHITECTURAL	JNT.	= JOINT
ADJ.	= ADJUSTABLE		
B	= BOTTOM	LL	= LOWER LAYER
B.P.	= BASE OR BEARING PLATE	LL.	= LIVE LOAD
BLDG.	= BUILDING	LSSJ	= LONG SPAN STEEL JOIST
BLK.	= BLOCKWORK	M	= MOMENT
BR.	= BRAM	MAX.	= MAXIMUM
BRK.	= BRICKWORK	MACH.	= MECHANICAL
BSMT.	= BASEMENT	MEZ.	= MEZZANINE
		MIN.	= MINIMUM
CF	= CONCRETE FIREPROOFING	MISC.	= MISCELLANEOUS
C.L.	= CENTRE LINE	ML	= MIDDLE LAYER
COL.	= COLUMN		
CONC.	= CONCRETE	N.E.	= NEAR FACE
CONSTR.	= CONSTRUCTION	NF	= NO FIREPROOFING
CONT.	= CONTINUOUS	N-S	= NORTH - SOUTH
C.J.	= CONSTRUCTION JOINT	NTS	= NOT TO SCALE
DET.	= DETAIL	%	= ON CENTRES
DIA.	= DIAMETER	OPNG.	= OPENING
DIM.	= DIMENSION	OSJ	= OPEN WEB STEEL JOIST
D.L.	= DEAD LOAD		
DWG.	= DRAWING	P.	= PLATE
DVL.	= LEVEL	PLF	= POUNDS PER LINEAL FOOT
		PSF	= POUNDS PER SQUARE FOOT
EA.	= EACH	PSI	= POUNDS PER SQUARE INCH
EL.	= ELEVATION (IN FEET & INCHES)	PROJ.	= PROJECTION
ELECT.	= ELECTRICAL		
ELEV.	= ELEVATOR	R	= REACTION, RADIUS
E-W	= EAST-WEST	REINF.	= REINFORCING
EXIST.	= EXISTING	REF.	= REFERENCE
EXP.	= EXPANSION		
EXT.	= EXTERIOR	SECT.	= SECTION
		S.L.	= SUPERIMPOSED LOAD
FF.	= FIRE FACE	SL.	= SLAB
FIN.	= FINISHED	SP.	= SPANDREL
FL.	= FLOOR	STL.	= STEEL
FTG.	= FOOTING	STD.	= STANDARD
FT.	= FOOT, FEET	T	= TOP
		TEMP.	= TEMPERATURE
GA.	= GAUGE	UL.	= UPPER LAYER
		VERT.	= VERTICAL
H.C.	= HORIZONTAL	UP	= UP
		VS.	= VERS



